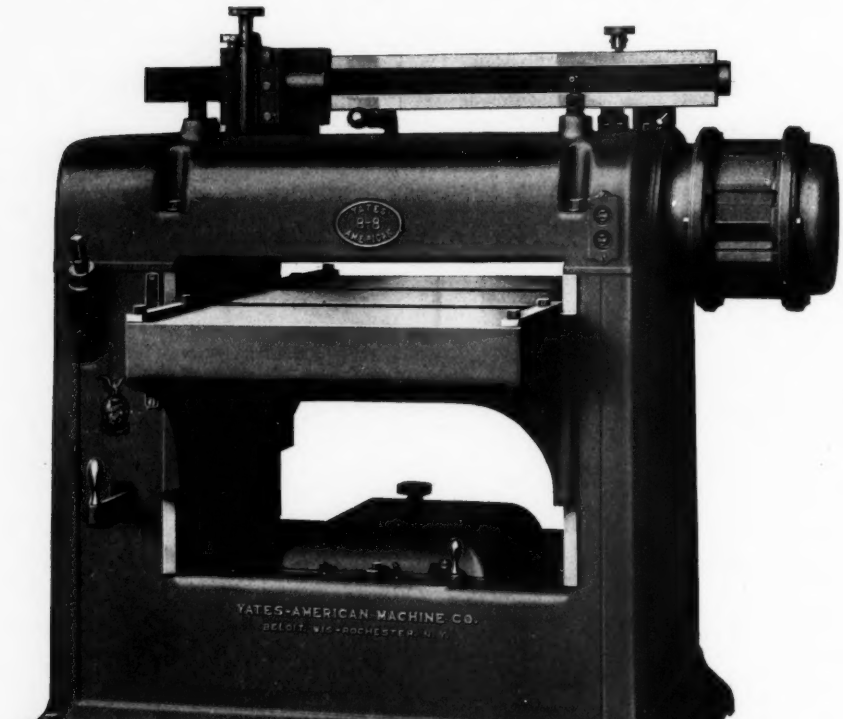
THE INDUSTRIAL ARTS MAGAZINE

AUGUST, 1927

THE BRUCE PUBLISHING COMPANY
MILWAUKEE, WISCONSIN

Something New
IN SINGLE SURFACING



The YATES-AMERICAN *B-8*

THE FACTOR of safety in the new B-8 Single Surfacer alone qualifies it especially for use in the school shop. It is as safe to operate as a machine can be made. All operating parts are enclosed — nothing projects. Being direct motor drive, the B-8 is easy to control. The little lever under the table makes the changes in feed. The lever at the side operates a belt tightener which permits nursing, starting, and stopping of the feed. The cutter-head spindle runs in ball bearings. The machine is rigid, sturdy, simple, and compact.

Training in the school shop is not complete unless aided by the use of up-to-date equipment. The B-8 is the modern single surfacer. It meets every requirement of the Manual Training School.

The B-8 is furnished in two sizes — 24 x 8 and 30 x 8. The smaller is especially suited for school use. Write for the full details. After reading them you will agree that the B-8 should replace at once, in every school shop, any old type single surfacer that may now be in use.

YATES-AMERICAN MACHINE COMPANY,
Educational Department,
BELOIT, WISCONSIN.

THE INDUSTRIAL ARTS MAGAZINE

Volume XVI AUGUST, 1927 No. 8

WORK

Frederick M. Trumbull, Superintendent of Junior Placement, Rockford, Illinois

A REFLECTIVE CONSIDERATION of the occupational world reveals work as our individual and our collective struggle for existence. Work is a primary instinct inherent in all of us. A wag might be inclined to add that as an instinct it appears to be quite feeble in some of us. It is, however, a basic instinct and originates with the instinct for self-preservation and self-perpetuation.

As human beings we are differentiated from other members of the animal kingdom by our endowment of superior mentality. In our struggle to secure food, clothing, and shelter we are not limited to the exercise of adaptive ability. We are endowed with initiative and constructive ability. We have power to modify and control our environment. The exercise of this power down through the centuries has enabled us to develop and bring about our present social and economic status. Our complex organization of farm, factory, transportation, communication, finance, and government is the cumulative result of a continued attempt to better cope with the problems of living.

In the evolution of this social and economic organization we have come to recognize the principles of honesty, integrity, loyalty, respect for the rights of others, the necessity for discipline, the necessity for conserving health, and the necessity for making special preparation for special kinds of work. As each individual approaches maturity he finds himself obligated to assume a personal burden of work. Whatever work he may undertake and however humble or apparently insignificant his beginning efforts, his personal progress and success depend upon his acceptance and application of these fundamental principles. Any tendency on his part to disregard these principles indicates a coincident tendency to dodge or evade responsibility for his burden. This may be the result of incompetence or it may be the result of positive antisocial inclinations. The two are equally dangerous. Each breeds the other. Both are cowardly. Courageous assumption of the burden comes through self-respect, through ambition which includes the vision of better living, and through self-confidence born of knowledge and preparation. Courage transforms the burden into an adventure.

Work is the big adventure in life. The hopes, the aspirations, the ambitions, the romance of life are bound up in lifework plans. Work is the one big adventure with a universal appeal. The most humble and even the sluggard build lifework plans and find the acme of their joys and sorrows interwoven with the success and failure of those plans. The higher up in the scale of intelligence and initiative, the more intense are the joys and satisfactions that come with the successful development of work plans and the more depressing are the disappointments that come through failure and misfit in employment.

Work interests arise early in life. The child in the kindergarten delights in the simple imitation of adult occupations. The make-believe farmer, carpenter, shoemaker, dressmaker, housekeeper, doctor, and nurse are absorbing interests. Later on the child of 9 or 10 years builds air-castles and day-dreams in which imaginary action continues to center about occupational situations. The boy becomes a hustling milk-wagon driver, a climbing lineman wearing a belt hung with mysterious tools. The shy, self-conscious little girl transports herself to the tenth floor of a department store and becomes a gracious saleslady, a haughty cashier, or perhaps a kindly matron of the restroom.

At 14 and 15 years of age day dreams give way to a definite and intense desire to actually engage in occupational pursuits. To many boys and girls at this age, school becomes too dull, too slow, too far removed from the apparently real and worthwhile activities of life. In their eagerness to participate in adult occupations they naturally become impatient and overanxious to break away from the tedium of school restraints. Add to this tendency just a little economic pressure, either fancied or real, and school interests evaporate.

When the family exchequer is low, algebra and Latin become a dead load, even an abomination, to Jimmy whose clothes are growing a bit scant and threadbare. Why should he endure the ignominy of sleeves conspicuously short at the wrist and trousers which have deteriorated into a sort of hybrid, being neither short nor long? The sly jibes of facetious companions make him a shrinking nobody ostracized from companionship and activities as dear to him as life itself. Stung into action, initiative carries him to the grocer round the corner who offers him six dollars a week if he will quit school and go to work. The world suddenly becomes ablaze with morning light. He can soon earn a "swell" new suit and he has visions of blue silk socks "an' everything" that mother has heretofore failed to supply.

Elizabeth, 15 years old, in a home of restricted means, wants satin slippers, silk hosiery, and party dresses just as much as her cousin in less stringent circumstances. In fact, they are just as necessary to her. The interests of these two girls are identical. To Elizabeth a job in the "dime store" or in the candy factory appears to be a logical solution of her most perplexing problem. Perhaps if the situation is not too tense, she may determine to quit high school and go to "business college" for three or four months to prepare for a real office job. Such a possibility would raise her social status to an envied level.

Jimmy on a delivery truck and Elizabeth at a sales counter are potential millionaires. They sit "on the top o' the world." Their days at work do not drag, nor is there aught of drudgery in their tasks. They are producers, not mere consumers. Their shoulders are squared and their heads lifted in self-respect. They have attained independence. They believe themselves the salt of the earth. They are the salt of the earth.

But Jimmy and Elizabeth are engaged in real adventures and their paths ahead are strewn with rocks and thorns as well as roses. Dangers beset them from many directions. Difficulties are ever arising, tending to deflect them from the paths of assured progress. They will meet temptations which they do not know how to resist. They will find themselves involved in problems which they do not understand. Their wants will increase in geometric ratio. Their ability to satisfy these wants will develop slowly. The road to desired attainments will often appear to be hopelessly blocked. When these situations arise, how will Jimmy and Elizabeth react? Will they be able to keep faith with themselves? Will they be able to hold themselves to the principles upon which progress and happiness are founded? Will they continue to be the salt of the earth?

Jimmy may graduate from the truck into the store and become a trusted order boy. After becoming familiar with the stock and the problems of the store, he may become an efficient sales clerk. He may build up a clientele all his own. As the years go on, through thrift he may be able to acquire stock or a partnership. He may develop business sagacity and executive ability, and eventually become a director of an organization which will continue to demand his best ability on down through the years. Such a career will bring him not only a generous share of the good things of this world but also that which is of more importance, some of the satisfaction of living a full and worthwhile life. Whether he follows out this particular line of development is immaterial. Progress is the essential.

But Jimmy may fail to work out a well-ordered and successful career. He may wander into paths leading less directly to personal success, if not actually away from it. Lack of progress and even absolute failure may come through other causes than moral laxity or mental deficiency. He may be tempted away from his first job in the grocery by the prospect of more pay in a factory. His pal already in the factory speaks to the foreman and in a short time Jimmy gets on as a helper to a crater at two dollars more a week than he was getting at the store. After a few months, and before he has acquired any considerable knowledge of the factory or its product, he hears of a contractor who pays common laborers a half more than he is earning in the factory. Having now attained a man's stature and a man's strength, he is anxious to try himself out. He quits the factory and chases the rainbow of more money and a new job. He lands his job all right, handles it well, and draws a man's pay. But his tenure is short. The job is soon finished and he becomes a rolling stone.

The comparatively high wages he has drawn have destroyed his interest in work with less pay. He leaves home and wanders afar in search of the casual and more highly paid employments. Healthy, carefree, and happy-go-lucky, he drifts on. After a few years of knocking around, alternately earning and spending, he finally acquires a family and with it the need of a home and a steady income. This suddenly and rudely awakens him to the realization that he has been travelling in circles. His employment career has led him nowhere. He also wakes up to the fact that he is heavily handicapped. He has only a limited education, having left school early. He has no specific training for the upper levels in any kind of work. He has not even the advantages of the education and training that comes through persistently working at some one line of work. He has reached an age and a status which bar him from apprenticeship connections. He is excluded from any situation comparable to an apprenticeship. With a growing family to support, he cannot undertake low-paid employments, no matter how promising the training opportunities may be. His needs are now immediate and pressing. He will be most likely to continue in production jobs at common-labor levels.

Jimmy now faces a painful and perhaps a dangerous ordeal. He sees former associates of perhaps lesser original capacity than himself rising to positions of responsibility. They are enjoying enviable prosperity. They are providing comforts and luxuries for their families far beyond his ability to provide. They have some assurance of permanent prosperity. Moreover they are pridefully conscious of their obvious successes. Jimmy does not hold a position. He has a job and his job is in the level where men are frequently more plentiful than jobs. He is able to maintain his family barely above the poverty level. When industrial depression occurs, he is among the first to feel it. Every indication points to a continuance of his precarious economic situation. He becomes resentfully conscious of his own obvious failure.

Finding himself in this situation, facing these discouragements, can he command sufficient optimism to preserve his faith in himself, in his fellowmen, and in the existing social and economic order? Can he fight off bolshevism? Can he, in spite of his handicaps, still command initiative and persistence and fight on to the achievement of a real success, not necessarily in terms of material wealth or position but at least in terms of finding a steady job, sticking to it and maintaining a home pervaded with the spirit of love and mutual confidence? If so, he may yet laugh at the rocks, forget the tortures, and pursue the adventure of life with the courage born of optimism.

What becomes of Elizabeth? When she leaves school and steps out of the home circle for the first time to engage in gainful employment, to dip chocolates, to feed strips of tin into a noisy punch press, to type letters from a dictaphone, to teach school, to manage a cafeteria, to do whatever kind of work she may be prepared and able to do, she enters upon an adventure just as interesting and with just as much at stake as in the case of Jimmy. As she proceeds she will encounter dangers and difficulties more varied, more subtle, and often more discouraging than those which confront a young man. The changing status of young women in our modern civilization has added to the complexity of her problems. The young girl is now thrust into a new world of opportunities. George A. Coe in his recent book on "What Ails Our Youth" states the situation in these words: "Life showers her with invitations to achieve, to adventure, to enjoy, all spiced with novelty and unprecedented self-determination." Who of us are wise enough to guide her? Least of all those of us who cannot see the futility of precedents which are obsolete and no longer valid. Nor are they to be trusted who would cast precedent aside simply because it is old.

Elizabeth may follow fairly well-defined and conventional paths. If she is high-spirited and possesses much initiative, she may take advantage of the trend of the times and become a pioneer. In either case conscious progress is as essential for her as it is for Jimmy. Whether she follows out an independent career or whether she eventually becomes a wife and mother, her success, her happiness, and her welfare will depend upon her being able to look back from any point as she proceeds with a sense of pride in her achievements up to that point and with a sense of security in the friendships she has built up along the way. In such a frame of mind she can face the challenge of the future with courage and self-confidence.

The buoyancy of youth will carry our Jimmies and our Elizabeths through much disillusionment and through many disappointments. They must make many adjustments and readjustments if they keep to paths of progress. It is blundering into byways that is most dangerous. Self-confidence suppressed and optimism destroyed paves the way for pauperism and bolshevism. Their own safety and the safety and welfare of the rest of us requires that these young people catch and hold a vision that fires them with dynamic ambition. That ambition must hold them to a clear-cut moral code and to a persistent drive toward an ever-forward-moving goal.

Their optimism must be preserved through the exhilaration that comes with success and recognized progress. These are the only conditions under which they can carry on in the big adventure contributing to community welfare and securing for themselves the comforts, the satisfactions, and the happiness that accrue with successful and right living.

Parents, educators, industrial executives, and business men, all of us, need to give more thought and study to the problems of our boys and girls who because of necessity or for other reasons tend to leave school early. Thousands upon thousands of these boys and girls between the age of 14 and 18 every year break away from partially completed high-school courses to become junior wage earners, to try themselves out in the big adventure. A few take this step because of real necessity. The great majority simply yield to the call of adventure. They have not sensed the need nor the value of training. Most of them are ready to take any kind of job that offers and are too ready to shift from job to job on trivial pretexts.

We are drawing upon our best leadership for the initiation and maintenance of vocational-training programs both in schools and in business and industrial plants. Evening schools, apprentice classes, and continuation schools, are being fostered, and the scope of their activities is being extended. Full-time vocational-training courses are attracting many who would otherwise leave school earlier.

Perhaps the most effective of all plans yet devised is the half-time cooperative school course which is arranged to articulate with a half-time work schedule and is at the same time a close correlation of school study with the line of work undertaken. Two individuals work as a team, each alternating with the other on the job and at school. This cooperative plan has passed the experimental stage. It should be made available to larger numbers of young people of high-school age in connection with several rather clearly defined lines of work.

The plan is gaining in favor with both educators and employers. It affords many advantages to both student and employer. Suffice it to say here with reference to the youthful student that by linking training and work more closely together we accomplish three things. First, we at once satisfy the natural and inherent urge to adventure into work experience. Second, we provide relief from possible economic stress. Third, through cooperative training paralleled by actual participation in productive employment the junior wage earner's vocational horizon is enlarged, his conception of business and industrial relations is clarified, and his faith is strengthened in himself and in the field of work he has chosen.

THE DALTON PLAN APPLIED TO MANUAL ARTS

U. D. Walker, Chester, West Virginia

THE DEMONSTRATION HIGH SCHOOL of West Virginia University for the past two years has been operating on the Dalton Plan, under the direction of Mr. Ernest Jackman, principal of the Dalton High School, Dalton, Mass.

It is the purpose of this article to show how manual-arts work is taught under the Dalton Plan.

The demonstration school runs during a period of nine weeks through the summer and is open to students from the seventh to twelfth grades inclusively. This nine-weeks period is broken up into three three-weeks periods, and the teacher in each subject makes out his assignments to cover three three-weeks blocks of work.

At the beginning of the term the Dalton Plan is explained to the students. They then enroll for the subjects they desire to take during the summer. Assignments or contracts of work are then given out in the different subjects. The students are also supplied with contract cards, which are simply cards ruled in such a way as to have a vertical column for each subject. These columns are divided horizontally into fifteen parts, each of which represents one day's work during the three-weeks period. (See Fig. 1.) As the student progresses in his work he marks his progress on the card with a straight vertical line drawn through the spaces of the column representing the work he progresses in.

He then takes his progress card to the instructor for approval. If approved, the instructor parallels the student's line with a red line. When the three weeks' work is finished, the teacher signs the card and marks the grade on it.

When all the subjects on a pupil's card are finished and approved by the teachers, the student presents it to his faculty adviser. The adviser then makes out a new progress card which is in turn taken to the various teachers who issue the corresponding contracts of work to the student.

The teacher has what is known as a room chart which is a large card ruled in such a way that the students' names can be placed on it. Each name is followed by fifteen spaces. The student is required at all times to keep his progress marked on this room chart so that it corresponds with the progress on his progress card. This furnishes a means for the teacher to check up on the progress of his students. This room chart is also used as a means for calling conferences on the basis of the varying rates of speed of the students. That is, if the teacher wants a conference with those who have completed five days', or one week's work, he can look at the room chart and tell just how many are in this group.

The school day was divided as follows:

7:45-8:00 A. M.—A fifteen-minute period used as a general assembly for taking the roll and making announcements.

8:00-10:45 A. M.—This is used as a "workshop" period, that is, the pupils during this period are free to go to any of the rooms representing the different subjects, to work on their contracts.

10:45-11:00 A. M.—General assembly period for taking roll and making announcements. Final general assembly of the day.

Beginning at 11 o'clock, the remainder of the day is divided into 30-minute periods with the exception of the noon hour.

Individual or group conferences may be called during any of these periods, by the different teachers. These conferences are called by means of notices placed on bulletin boards in the halls. Space is allotted on these boards to each class, and it is the business of the members of each class to watch their section of the board.

Although these conference periods are 30 minutes in length, the teacher may obtain a longer period if desired by

calling two conferences of the same group in successive periods.

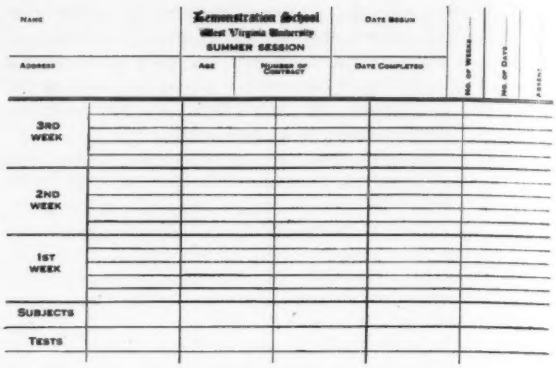
Since manual-arts work must be taught largely by individual instruction under any system, the Dalton Plan possibly does not make such a radical change in the methods of instruction as in other subjects. The assignment of work on job sheets in manual-arts work is quite generally used in the schools at present, this method of assignment being very similar to that used in the Dalton Plan. Even though the method of teaching is not changed much, I see some advantages in using the Dalton Plan. One of these is in the presentation of the demonstration. The demonstration is a teaching method used largely in manual-arts work. The common way of giving demonstrations is to either hold the class together and give each successive demonstration to the class as a whole, or to divide the class into two or three groups, according to speed, and give the demonstration to each of these groups as they are ready for it.

Often a teacher of manual arts has two or three classes a day in the same subject. It will readily be seen that under these conditions a teacher must necessarily repeat the same demonstration several times. Under the Dalton Plan where there are no regular classes, because all the students come and go as they see fit, conferences may be called according to the advancement of the students. This avoids some repetition of demonstrations and the consequent waste of time. Demonstrations given in this way also have the advantage of being timed just right, so that the student may make use of the demonstration immediately.

Another thing I have noticed in the shop under the Dalton Plan is that the discipline has been good, with very little need for the teacher to mention the matter to the students. By discipline I do not mean a squelched attitude on the part of the student, but rather a lack of horseplay. The boys seem to come to the shop with a more businesslike attitude.

One of the disadvantages is the method of checking tools. Under the Dalton Plan the pupils are coming and going at all times and if the teacher is very busy, it is rather hard to keep check on the pupils' care of benches and tools. Under the old plan, at the end of the class period, the writer had each boy clean up his bench and put away the tools, leaving the drawers open for inspection. When all were ready I passed down the aisles, and glanced into each drawer to see that the tools were all there and properly arranged. As each bench was inspected the drawer was closed. Under the Dalton Plan the problem is solved by impressing upon the student his responsibility for the tools in the bench he uses, and showing him that it is necessary to report anything missing immediately upon opening the drawer to start work. When leaving the shop, the student is required to call the attention of the instructor to his bench to show that he has left everything in proper order.

Another disadvantage is that the slow pupils become discouraged because of getting so far behind. Possibly these students do not become any more discouraged under the Dalton Plan than any other, but they have the opportunity of leaving the shop when they desire and, if they become discouraged, they are very likely to slight their work and thus get farther and farther behind. This, of course, must be adjusted by the teacher by working with these dull pupils as much as possible and encouraging them in their work. If the interest of these slower pupils can be held until the latter part of the term, a great deal more of the teacher's time can be devoted to them, as the faster pupils are finishing the



FORM FOR RECORDING PUPILS' CONTRACTS.

required work. Of course under any system there will always be some who do not progress as they should.

In regard to the making of contracts, the writer believes that the fundamental operations should be taken up in detail on the contract, and general information given, along with questions to be answered. Then a group of projects for the student to choose from may be drawn and directions given with each drawing. The student is then allowed to choose one of these projects or any other suitable project which he may suggest.

The contract should be made out with the idea that a certain amount of work shall be done during the term. For instance, in a school where the term is divided into semesters, the teacher should try to make out his course according to what the average student should accomplish in 18 weeks, 5 days a week, or approximately 90 hours of time. Of course it is necessary in marking advancement on the progress card to estimate this progress to a certain extent upon the time that the student spends in the shop, but at best this is only a rough measure.

If the teacher has set forth a certain amount of work for the pupils to finish during this time, they know at all times just about where they stand and what to expect. I have found in questioning the students that they know just how they are "getting along." The students should be given to understand that they have a definite amount of work to do and when that is finished the course is finished. Naturally there are some who will finish far ahead. However, it has been the writer's experience that many of these come back to the shop after finishing the required work and ask to continue in the shop.

The Dalton Plan according to my observations may be successfully applied to manual-arts work. The principal advantage in doing so is that previously mentioned in regard to demonstrations. However, I do not see that it is going to make a great deal of difference whether manual arts is taught according to the old method or on the Dalton Plan, so far as results are concerned. I do not feel that any shop teacher need worry about the results if the Dalton Plan is introduced into his school. If he makes his work really interesting and worth while, the majority of students will spend more than the necessary amount of time in the shop.

The following outline gives an idea of the third three-weeks contract which was in sheet-metal work:

CONTRACT FOR THIRD THREE WEEKS

The work in the woodshop should now be finished by all the students in this group. We shall now take up an entirely different kind of work—sheet-metal work. In this it will be necessary to be-

come acquainted with new tools and materials. These will be taken up as we proceed.

This work will be done in the sheet-metal shop. As there are not individual benches and tools for each boy, it will be necessary to work together and use the tools in turns, with as little commotion as possible.

The different problems will be taken up in conference as we proceed. With the instructions given in this assignment some practical and useful articles can be made. At the same time you may learn the use and care of simple sheet-metal tools, which knowledge should be of benefit to you in your later life.

Shop Suggestions

1. Place all waste stock in the box which is provided for it.
2. Keep the workbenches and tools in neat and orderly condition.
3. Do not allow the soldering copper to become red-hot.
4. Do not adjust the gas; call the attention of the instructor if this is necessary.
5. Be careful in use of the soldering acid, as it may cause serious injury if brought in contact with the eyes.
6. Do not play with any of the machinery.
7. Be sure soldering coppers are always thoroughly cleaned before using them.
8. Do not interfere with classmates at their work.

Lesson I

Making a simple lap joint.

a) Preparing tin for the joint.
- (1) Cut two pieces of tin 2 in. wide by 4 in. long.
- (2) Measure in from one edge on each of these pieces ¼ in. and scribe a line with the scratch-awl.
- (3) Be sure the parts to be joined are free from dirt and grease.

b) Preparing soldering copper for use.
- (1) Clean the copper by filing it until it is bright on all sides about 1 in. back from the point.
- (2) Light the gas and heat the copper.
- (3) Put a small amount of soldering acid or flux on a piece of metal. After the copper is sufficiently hot, place it on the acid on this metal and clean it on all sides by rubbing in the acid.
- (4) Next touch the bar of solder to the copper and continue rubbing on the metal until all sides are bright and covered with solder. This is called tinning the copper. The copper is now ready for use.

c) Soldering the lap joint.
- (1) Upon the section of pieces of tin which are marked off and which are to be joined together, put some soldering acid.
- (2) Place the pieces which are to be joined in the position which will bring the marks together. Hold these pieces firmly together by pressing with some solid object.
- (3) Next take the soldering copper from the gas and place it on the tin at the joint, holding it there until the solder runs freely. Then run the copper slowly over the joint until the solder has run along the full length of it. If this procedure has been followed through carefully, a very solid joint should be secured.

Questions

1. Why should the pieces to be soldered be cleaned before attempting to solder them?
2. How are the sizes of soldering coppers given? Why?
3. What is a flux?
4. What is meant by tinning the copper?
5. Why is it necessary to use a flux when soldering metals?
6. Tell how to make a common flux.
7. Why are soldering coppers given the name "copper"?

Lesson II

Making a lock seam.

a) Preparing the metal for the joint.
- (1) Cut two pieces of tin 2 by 4 in.
- (2) Mark each of these pieces ⅜ in. from one edge.
- (3) Place in folding machine and adjust the machine until the line on the metal is just visible.
- (4) Fold each of these pieces.
- (5) Hook the folded pieces together and place them on something solid. Next tap the joint with a hammer until the two pieces are firmly pressed together.
- (6) Next take a hand groover and hold it on the joint. Hammer this down moving the tools along the seam. This if properly done will form a solid lock seam. If this is to be a water-tight seam, it must be soldered.

Questions

1. How much extra metal should be allowed on a piece to make a ⅜-in. lock seam?
2. What is a hand groover used for?
3. Why is a lock seam better than a lap joint?
4. How do you indicate the thickness of sheet metal?
5. What are the common sizes of tin?
6. How is bright tin made?
7. What makes a tin cup rust?

Lesson III

Mending.

a) If a hole is very small, it may be mended by simply soldering it. However, if the hole is very large, it will be necessary to place a patch on it. We shall repair one article by each of these two methods.
- (1) In either case, clean the metal thoroughly around the hole and apply acid, then if the hole is small heat the soldering copper and tin it, then close the hole by applying solder.
- (2) If the hole is large, cut a small piece of metal to use as a patch, then apply acid around the hole and on the patch. Solder the patch to the object to be repaired.

Questions

1. Why can't a large hole be mended with solder alone?
2. How can you determine whether or not the article is worth repairing?
3. What kind of acid is used in soldering galvanized iron?
4. Of what is solder composed?

Lesson IV

Making a sugar scoop from an old tin can.

a) Select a can of about the size desired—one which is in good condition.
- (1) Clean all the paper off the can and mark a line to represent the shape of the scoop to be made.
- (2) After the lines have been drawn and approved by the instructor the scoop may be cut out with the tin shears.
- (3) Cut a small piece of tin to be used as the handle. Dimensions will be furnished by the instructor.
- (4) Next turn the edges under about ⅛ in. on this piece and form to shape desired for the handle.
- (5) Place this handle on the back of the scoop; be sure that it is held straight and in the center of the scoop; then solder it in place. If care is taken a very neat scoop may be obtained.

Questions

1. What is meant by stretchout?
2. How can you make a pattern or stretchout of the sugar scoop?
3. What is another name for shears?
4. How are different sizes of tin cans indicated?
5. How can you remove the burred edge left by the snips?

Lesson V

Making a cooky cutter from a tin can.

a) Select a can of the size which would be desirable for a cooky cutter.
- (1) Draw a line around the can about ¾ in. from the bottom.
- (2) Open the can with the tin shears and cut around the line, being careful to save the part which is cut off.
- (3) Lay the piece you have just cut out on a block of wood and with a 1-in. punch, punch a hole through the center of it.
- (4) Straighten the piece which was cut from the top part of the can and cut a piece from it about 1 in. wide. Make this piece long enough to be used for a handle.
- (5) Fold the edges of this piece under on the folding machine and form into a semi-circle to fit the cooky cutter.
- (6) Solder this handle to the cutter. In this way a very serviceable cooky cutter may be made.

Questions

1. Why is it best to punch a hole in the upper part of the cooky cutter?
2. Why is it necessary to hold two pieces of tin together firmly when soldering?

Lesson VI

Construction of a match box.

a) Obtain the patterns from the instructor.
- (1) Draw the outline on a piece of metal and cut out with tin shears.
- (2) Fold according to directions.
- (3) Solder joints.

Questions

1. What tools would you purchase to do small sheet-metal jobs around the home?
2. What is a folding machine?
3. What is a cornice brake?
4. What is a squaring shear?
5. Why is it necessary to clip the corners of the lap in making a lap joint?

Lesson VII

Making a quart measure.

1. Cut a piece of stock 3⅞ in. wide, 16¼ in. long.
2. Notch the upper corners for wire and lower corners for burr.
3. Set the folder ⅛ in. for the lock and place the piece in folding machine with the side clipped for wire toward the left, and turn the lock in opposite directions on the ends of the piece.

4. Set the folder for turning the edge for the wire. See the instructor.
5. Cut the wire to required length.
6. Put the wire in place and finish with the wiring machine; drive it through ½ in. from the end on which the lock is turned toward the wire.
7. Form to shape, having wire on outside, by placing wire edge in grooves at right-hand end of rolls.
8. Groove the seam with the No. 4 groover or as otherwise directed.
9. Turn a ⅛-in. burr on the bottom and tack the seam with solder near the bottom to keep it from slipping apart.
10. Cut the bottom ¼ in. larger in diameter than the diameter over the burr.
11. Turn a burr on the bottom with the burring machine.
12. Set down the bottom with the setting-down machine.
13. Double seam the bottom on the seaming stake, using a mallet.
14. Solder the bottom seam with the bottom soldering copper, and the side seam with the pointed soldering copper.

Questions

1. What is meant by burring?
2. How are wire sizes given?
3. What is a wiring machine used for?
4. What are forming rolls used for?
5. What are the grooves in the right-hand end of the rolls for?

Lesson VIII

Making a funnel.

1. Watch carefully the demonstration by the instructor of the turning of the locks for the seam, also the fitting of the body and the forming of the wire ring.
2. Set the dividers for the radius of the semicircle to the diameter of the top of the required funnel, plus ¼ in. for No. 13 wire.
3. Place the dividers ⅛ in. from the edge of the blank and strike a semicircle, this ⅛ in. allowing for locks.
4. Set the dividers to the diameter of the hole required for the spout of the funnel, and using the same center as before, strike small semicircle on pattern.
5. Cut out the blank for the body and clip the upper corners for the wire and lower corners for the spout.
6. Turn the edges for locks in opposite directions.
7. Form to shape on the blowhorn stake.
8. Lock the edges together and groove, using the No. 4 hand groover.
9. Turn the top edge for wire and place the wire in the top of the funnel.
10. Develop the pattern for the spout as directed by instructor and cut out.
11. Form the spout to shape having edges lap ⅛ in., using the blowhorn stake, and solder the lapped edges together.
12. Solder the spout to the body of the funnel, having the seam of the spout in line with the seam of the funnel.
13. Form a ¾-in. ring of wire (see instructor) and fasten to the funnel by the loop placed under the wire at the seam.

Questions

1. What is the purpose of putting wire in the edges of objects?
2. Why is it necessary to form the funnel on a blowhorn stake instead of the forming rolls?
3. Why is it necessary to push the end of wire back from the joint in round objects?

CORRELATION OF THE FINE ARTS AND THE MECHANIC ARTS

Gertrude L. Turner

A MUCH-ADVERTISED American periodical, so late as last year, solemnly professed to discover the truth that all human beings preparing to earn a living should be relegated to the scrap heap of the trade school or the industrial plant, in order to leave the colleges free to their betters, who are preparing to live. I say that this viewpoint is utterly wrong. The fine arts and the mechanic arts are intimately akin. They never should have been separated. Since the divorce has taken place, let us rewed them at the earliest possible opportunity.

The fine arts? What are they? Music, painting, architecture, sculpture, poetry—possibly these names come to us first.

Music, which soothes even the savage breast and charms the wild beast into submission—how much music would be within the reach of the world today if the imagination of the craftsman had not correlated with the imagination of the musician? If his skilful fingers had not done what the musician could not do, fashioned a vehicle for the conveyance of related sounds? Stradivarius, Amati—were not they artists equally with Mozart and Beethoven? Why does one violin produce beauty, while another shrieks forth squeaky or raucous tones? The first is the product of imagination, plus love of work and pride in perfect craftsmanship. The second is the direct or indirect achievement of a man who earns a living but knows little or nothing of the meaning of life.

Sculpture? Any trained draughtsman or modeler in clay can reproduce a dead likeness of a face. Only the artist can fix the fleeting expression which calls the statue to life. Yet what would become of the vision of the sculptor if he could not master the laws of his medium? The craftsman who does not originate that vision can faithfully interpret it in clay and marble and bronze only if his imagination is kindled into flame by contact with creative imagination.

Architecture? It is subject to the most rigid mathematical laws. Some think that it can be taught to any clever youth. But one building is an object of desire and another a cheap machine product. Why? Because one architect has built from a house of dreams, while the other has put building materials together as cheaply and quickly as possible. Nevertheless, the first architect was dependent upon the technic of his craftsmen. The defects of the second might have been partially redeemed if his workmen had been masters of craftsmanship.

Painting? In the beginning, painters were craftsmen. They were taught to make pictures by formula as mechanically as one might be instructed in penmanship. Occasionally an artisan showed a strong love of color or a feeling for line or an appreciation of taste. This developed his imagination, which in turn evoked the spirituality necessary to make his work true art.

You may remember the poor mason's son, Coravaggio, born in the Italian mountains in 1596. He was a boy of mechanical inclinations and inventive mind. He spent his boyhood watching fresco painters splash paint into the fresh mortar on a wall. Many a sign painter has been equally mechanically minded. Coravaggio fused craftsmanship and love of beauty into an art which lived to germinate the great Velasquez.

As all other of the fine arts, poetry is life, seen through a personality. If architecture is "frozen music," poetry is frozen feeling. Have craftsmen no personality, no feeling?

To walk through the depths of a pine forest in June, to trace the golden patterns, checkered by the sunlight as it filters through the cool, green boughs, to lie upon a thick, soft, fragrant bed of pine needles and succumb to the sleep wafted thither on sweet, sweet odors—that is poetry.

To thrill with delight as the keen shining steel obeys your will and levels the proud wheat, to bring it to the breakfast tables of a thousand boys and girls—that is poetry.

To lay bricks and envision those who shall come to inhabit the work of your hands, the stately father, the gentle mother, the tall, serious lad, the laughing, curly-headed lass, to picture the intimate familiar home life which shall grow within the work of your hands—that is poetry.

Poetry, painting, architecture, sculpture, music, the fine arts—there would be no mechanic arts without the fine arts. Radio, telephone, telegraph, motor, airplane, all are concrete embodiments of the imagination. "The old mechanic arts," so runs an inscription above the entrance to the Union Station in Washington, "controlling new forces, build new highways for goods and men, override the ocean and make the very ether carry human thought. * * *

"Man's imagination has conceived all numbers and letters, all tools, vessels and shelters, every art and trade, all philosophy, poetry, and polities." Why do you develop imagination in the artist and kill it in the artisan?

"But," you say, "the mechanic and the fine arts cannot be correlated." That is not so. Why not phrase it, "The mechanic arts and the fine arts can with difficulty be correlated." This is nearer the truth.

Why do I use the expression "with difficulty"? Because you, who are sufficiently interested in the correlation of the fine arts and the mechanic arts to read this article, and I, who am making such correlation my lifework, are pioneers blazing the trails for a new type of education, the highest type yet developed. I refer to mechanic-arts shop courses, which aim to give equality of opportunity to those who are not born with equality of heritage or equality of background. And equality of opportunity means an appreciation of sunlight as well as a place in the sun.

If we grope slowly along, marking the way for those who shall come after us, will the mediocre teacher have eyes capable of seeing our trail blazes? No! Yet, although the mechanic-arts group is guided by inspired leaders, there are many mediocre teachers in its ranks—the man who mistakenly believes that teaching is a softer job, the tradesman who is a social climber, the man who comes into the school system through the appointment of a politician or through relationship to a member of the board of education, the man who has learned half a trade and one third of a profession, who can neither teach others nor complete himself the project which he is attempting to put over to them.

Establish a definite correlation between the mechanic-arts and the fine arts, raise the mechanic arts to the level of the fine arts, and then demand that the mechanic-arts teachers have an academic background in the fine arts and that academic teachers instructing mechanic-arts pupils in related work have an industrial background. That will eliminate the mediocre teachers by the natural process of the survival of the fittest.

The immediate purpose of mechanic-arts in education is to give the boy a survey of the industrial world, to open his eyes to its possibilities, to disclose to him its riches so that he may become familiar with the fundamentals of all industry and may choose his lifework in industry, if his inclinations lie in that direction.

You who are a craftsman interested in the fine arts, or an artist interested in the mechanic arts, or the parent of live boys, do you know "The Story of a Thousand-Year-Pine"? Have you intrigued yourself with the little German romance of the young artisan who was forbidden to marry the loveliest girl in the village because her father considered a worker beneath him socially? "You may not have my daughter," said the irate father, "until you can build in the church an altar which is higher than the church itself." The ambitious lad carved the altar into an arbor of roses, which, if straightened out, would have stood higher than the church itself. Then he triumphantly led his bride to that altar.

Have you learned Edwin Markham's description of Abraham Lincoln?

Up from the log cabin to the Capitol,
One fire was on his spirit, one resolve—
To send the keen ax to the root of wrong,
Clearing a free way for the feet of God,
The eyes of conscience testing every stroke,
To make his deed the measure of a man.
He built the rail pile as he built the State,
Pouring his splendid strength through every blow:
The grip that swung the ax in Illinois
Was on the pen that set a people free.

So came the Captain with the mighty heart;
And when the judgment thunders split the house,
Wrenching the rafters from their ancient rest,
He held the ridgepole up, and spiked again
The rafters of the Home. He held his place,
Held the long purpose, like a growing tree,
Held on through blame and faltered not at praise.
And when he fell in whirlwind he went down
As when a lordly cedar, green with boughs,
Goes down with a great shout upon the hills,
And leaves a lonesome place against the sky.

Are you familiar with period furniture? I know a home in our township in which the head of the house has covered with spar varnish a beautiful old mahogany highboy. Would you subject old furniture to that indignity?

And the building trades! Are you interested, to any extent, in beauty of line? Do you remember that Greek artist who used as his signature a line so distinctive that none could imitate it?

Are you fascinated by the romance of building materials? "The Romance of Brick," "The Romance of Slate," "The Romance of Glass," these pamphlets and tons of others like them are at your disposal.

Can you answer this question: What definite contribution has America made to architecture?

"America has no architecture," you may insist. Someone else made that comment. A little later, he gave this comment, "The Greeks gave the lintel; the Etruscans, the arch; America, structural steel reenforcement. That is why we have skyscrapers. I didn't know that skyscrapers are real architecture!"

Printing? Have you gone back to the land of the Garden of Eden, the ancient Euphrates Valley? Here a man is gathering reeds from the river, shaping clay into tablet form, cutting into it by means of the reeds angular-shaped signs. Now he sets it out in the sun to bake. That man is a record maker or a printer. You may wander through the Nile Valley where the bee, which the picture writer is rapidly forming, denotes industry.

On a little strip of Syrian seaboard, the Phoenicians are devising queer combinations which their adventurous mariners are carrying from the Indian Ocean to the tin mines of Cornwall. Printers' apprentices set up today variations of those combinations—the letters of the alphabet.

It is a long journey from these to Charles Hanson Towne and New York:

I know a bookshop in a quiet street
Close to the flame and thunder of Broadway,
A little heaven, a refuge, and retreat
From the loud murmur of the staring day.
I read of pomp and chivalry and pride,
Or the bright laughter of a quiet age;
I dwell in moonlight on a distant tide,
What time I thumb and turn some yellow page.

Henry Turner Bailey, director of art in the Cleveland Museum, makes a valuable contribution to such correlation in his supplement to the December issue of the *Industrial Education Magazine*, entitled "For the Boys." He reproduces Giacomo Grosso's famous painting "The Son of a Carpenter." Beneath it he adds these words:

"Here is the boy Jesus in the carpenter shop at Nazareth. His work has been interrupted by a group of people at the door—his neighbors or perhaps strangers to the town who would see and hear him.

"At this moment, his words astonish his beautiful mother, puzzle Joseph, and fascinate his visitors.

"Never boy spake like this boy who grew in wisdom and stature daily and in favor with God and man.

"The light of the morning is reflected from his face so that it shines with startling radiance against the darkness of the room. And they who saw it and received such illuminating answers to their questions said: 'Ah! He is the Light of the World!' "

Which type of education is yours? Shall we thrust our boys into the outer darkness of the material world or lead them to the light of the spiritual world, the Carpenter's Son, whose birthday fires blaze forth on a thousand hills, beacons of life eternal?

AN EXPERIMENT IN COOPERATION

Charles R. Kinison, University of Illinois High School, Urbana, Illinois

MUCH HAS BEEN WRITTEN in professional textbooks and educational magazines about the correlation of the several departments of the high school. The authors of these texts and magazine articles have advocated the cooperation of all the teachers of given schools to the end that the pupils will receive a unified, well-rounded education.

If the pupils are to get such an education, the teachers of the several subjects must have some notion of what is being taught in the various classes that his pupils attend. How else will they be able to tie up the instruction which they are giving with that being given in the other classes? In addition to knowing something about what is being taught in the other classes, the instructors must plan their instruction with a conscious effort to link it up with the other subjects. Without the linking up there can be no unity.

The experiment to which the title of this article refers was undertaken at the University of Illinois High School, Urbana, Illinois. It was an experiment in cooperation between the home-economics class, under the direction of Miss Anna Belle Robinson, and the manual-arts class, under the direction of the writer.

These particular classes meet at the same hours daily, from ten to twelve o'clock. The suggested plan was that for one week the girls of the home-economics class meet with the manual-arts instructor in the manual-arts shop, and the boys of the manual-arts class meet with the home-economics instructor in the home-economics laboratory. The exchange was made for a week, and out of these experiences, in addition to the widened knowledge which the pupils acquired, the instructors have learned many things.

After it had been decided that the experiment would be undertaken, the question arose as to what information and instruction should be given to the two classes. The instructors held several conferences to determine the answer to this question, but each instructor was the final judge of the material that was given.

In planning for this week of experimental instruction, it was decided to begin as one would begin when making a course of study for a semester's work, that is, with the aims or purposes of the instruction. The instructors decided that the pupils should have, not merely a broader experience as a result of the week's work, but that the girls should have the ability to be a little more efficient as homemakers, and that the boys should have the ability to do a little more of their share of making "a house a home."

With these ends in mind a varied list of desirable topics and projects was compiled. This list had to be evaluated and shortened until it could be presented in the limited time. Finally, the order of presentation had to be arranged so as to utilize the time economically.

What the Girls Did

When the girls entered the manual-arts room and were seated, the instructor tried to make them feel at home by explaining the nature of the experiment. He told them some of the plans that he had made for the week. These plans included the demonstration of refinishing some small article of furniture, such as a taboret or a small stool, and the gluing up of a broken piece of furniture. They also included the sharpening of a knife and a pair of scissors by each member of the class. The first thing, then, was to plan for somebody to bring the small articles of furniture to be refinished and glued.

The instructor had also planned to have each girl make a simple wooden project which would involve the use of the try-square and plane, but when he saw the dainty dresses of the young ladies who made up the group, he decided that he would have to eliminate that part of his schedule. However, when he asked the class for suggestions for the activities of the week, he was very much pleased to hear a member of the class express the wish to handle some tools and make something. The nods of approval from the other girls immediately replaced the wooden project on the schedule.

The remainder of the first period was taken up with a talk on common tools. In this talk the instructor emphasized the fact that every home should have a few common tools and should have a definite place for keeping each of them. The list of "minimum essentials" includes a hatchet, a crosscut hand saw, a screwdriver, a pair of pliers, an adjustable wrench, a sharpening stone, and a box or other receptacle to receive an assortment of nails, screws, bolts, and nuts, which can easily be accumulated if there is a place to put them.

These tools were shown to the class, as were also those which made up a supplementary list of desirable tools. Some facts concerning the uses of these tools were also given. The supplementary list included a claw hammer, a small plane, a brace, with three or four bits, three or four wood chisels, a cold chisel, and a pipe wrench. With such a kit of tools, the housewife can make many small repairs about the home, and she can direct her husband—if he does not object—in making many others.

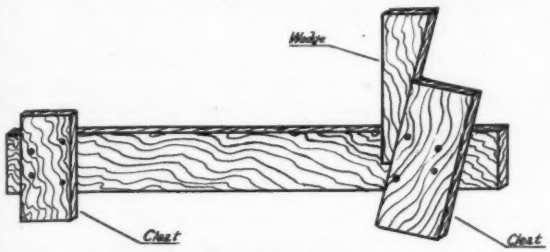
When the class assembled for the second day's work, each girl was assigned to a bench and given a piece of stock approximately 1 by 8 by 12 in. in the rough. The instructor gave a demonstration of squaring up stock, and the steps in this process were written on the blackboard. Then each pupil started to work to square up the stock. They were told that the finished product was to be a cutting board.

After the class had been at work about fifteen minutes, it was thought wise to have a rest period, and the girls sat on some sawhorses in the finishing room while the instructor gave a talk about finishing materials, their composition, preparation, and application. A demonstration of removing varnish and other finishes was also given at this rest period.

Three small articles of furniture had been brought by one of the girls. A stool and taboret were to be refinished, and the other piece was to be glued. The instructor had removed the finish from the stool on the evening previous to this demonstration, and after showing the removal of the finish on the taboret, he was able to demonstrate the beginning steps in refinishing the stool. This consisted in removing all high spots and raised grain by the use of fine sandpaper, and the application of a coat of shellac to seal the pores.

The demonstration period took up the remainder of the time, and the cutting boards had to be put away until the next day. After the boards were squared up, each girl made her board into the shape she desired, rounding the corners, and rounding the ends. The use of lacquer was explained, as the girls were using it to decorate their boards.

At another period a broken table was glued together, and this gave an opportunity for the instructor to tell about the qualities, composition, and uses of glue. While giving the demonstration of the gluing process, a steel-bar clamp was used. One of the young ladies, a practice teacher, volunteered the information that such a process could not be attempted in the home, for no bar clamps were available. Here was a point the instructor had overlooked. He immediately improvised a clamp that could be made in any home with the tools of the "minimum essentials" list. Taking a scrap of board of some 10 or 12 in. longer than the width across which the



DETAILS OF IMPROVISED CLAMP

The work to be clamped is placed between the two cleats. By driving the wedge the article is tightly clamped. If the cleats are too far apart, blocks may be inserted to take up the extra space. Note that one cleat is set at an angle so as to accommodate the bevel of the wedge.

clamp must reach, he nailed and clinched a cleat at each end of it. With the hatchet he hewed a wedge from another scrap. Putting the long cleated piece where the clamp had been and using the wedge and blocks to fill the space between the cleats, he was able to hold the table securely together while the glue dried.

Only a few of the steps in the finishing process could be demonstrated during the short duration of the experiment; however, the remaining steps were explained. The care of a finished article of furniture was also explained.

A talk was given on the kinds and sizes of nails and screws, and a demonstration of driving screws was given.

With the extensive use of electrical appliances in the home it is almost essential that the people who use these conveniences be somewhat familiar with the nature of electricity. In the limited time which was given to the experiment, only a small portion of the necessary information could be given. This time was devoted to an explanation of fuses, their construction, use, why they blow out, and their replacement.

A demonstration of the sharpening of scissors was given during the week, and each girl brought a knife and a pair of scissors to sharpen. They did very well in sharpening the knives, but their efforts with the scissors were not so successful.

What Might Have Been Done

If time had permitted, many other things could have been done. These things would have helped to attain the aim of the experimental instruction almost as well as those things which were done. The instruction dealing with electricity could have been extended profitably to include a more thorough discussion of the nature of electricity. This should be presented in such a way as to make it possible for the girls to understand what makes the ordinary household appliances work. They should also have the ability to care for the electrical appliances, and they should know what makes them fail to work and the dangers which surround them.

Not long ago a young lady was making cinnamon toast on an electric toaster. When some of the sugar got on the heating element and began to smoke, the young lady started to remove the burning sugar by scraping the redhot wires with a knife. Fortunately she was stopped before she accomplished her purpose. This probably saved her a severe shock, a broken heating element, and a burned-out fuse, but a knowledge of the nature of electricity would have kept her from attempting such an action.

The common appliances include curling irons, electric irons, toasters, warming pads, vacuum cleaners, electric fans, electric mixers, electric sewing machines, and electric washing machines. Often the cord leading to the appliance becomes broken, and the woman who uses it should know how to splice the cord and tape it. She should know how to make socket-and-plug connections. If time had permitted, every girl in the class would have made a splice and assembled an extension cord with plug and socket.

Many electrical appliances which are operated by motors are worn out long before their time because their users neglect to oil them. Most motors do not need oiling very often, and they will function for a long time after the bearings are really in need of oil. The girls should be taught how to oil the motors of their various electrical machines in order to prevent unnecessary wear and premature scrapping.

The girls should be taught that there is a stop and waste cock in every house, and that the first thing to do in case a water pipe bursts is to shut off the water at the stop cock. They can be told why faucets leak, and can be shown how to replace a worn-out washer in a faucet.

The hanging of framed pictures is a job that is usually left to a man, but why can't a woman learn to do it satisfactorily? She could hang all except the very heavy ones. This is another item which should be in our short course for girls. The sizing of rugs, the replacing of door knobs, the placing of screen hooks and springs, the oiling of squeaky doors, the tightening of table legs and chair legs, the loosening of tight-fitting dresser drawers and the wrapping of parcel-post packages are other items that should receive the attention of the girls in this class.

What the Boys Did

The home-economics instructor devoted most of the week to giving the boys an opportunity to acquire the ability to appreciate good taste in the selection of furniture to suit various circumstances. Lectures were given with this aim in view, and an observation tour was also made. Miss Annie Lou Maxwell, an expert from the home-economics department of the university, met the class at one of the large furniture stores downtown and conducted the boys on a tour of the store. She explained the good qualities and the bad qualities of the various pieces of furniture in certain situations. Most of the pieces of furniture were suitable for certain environments, and Miss Maxwell tried to show the boys the proper setting for each piece. She also mentioned situations where the pieces would not be pleasing.

After the observation of the store was completed, the boys were conducted through the rooms of the University Women's Club. The decorations, drapes, floor coverings, and furniture of these rooms were selected by an expert. The arrangement of the furniture was discussed and the things that made the arrangement pleasing were especially stressed.

On another occasion the boys were conducted through the Home-Economics Practice apartment of the university. Here another arrangement of furniture and other drapes and floor coverings were noted. Harmony in color schemes of floor coverings, drapes, and wall paper was one topic for discussion at this apartment. An inspection of the kitchen revealed many schemes for saving steps for the cook, and the electric dishwasher was an interesting exhibit.

During the recitation periods when the class was not on observation trips, talks were given about the selection and arrangement of furniture in the home.

What Could Have Been Done With the Boys

In addition to the excellent work which was given to the boys, a number of things dealing with foods and clothing could have been given if time had permitted. In many communities the facilities would not be suitable for carrying on the work as it was done in this experiment. Every school which has a home-economics class can do something along this line and can also do some of the things which will now be presented in outline form.

I. *Information to be gained about foods*
- 1. Functions of various foodstuffs
  - *a*) Muscle, energy, and heat making
  - *b*) Muscle building
  - *c*) General repair
  - *d*) Growth
  - *e*) Regulatory
- 2. Amount of food needed
  - *a*) Conditions affecting amount and kind of food needed
  - *b*) Size of 100-calorie portions
  - *c*) Amount needed by each boy in the class
- 3. What food is cooked
- 4. How food is cooked (frying, boiling, baking, broiling)
- 5. Reasons for using each method of cooking.
- 6. Characteristics of some foods (milk, green vegetables, starchy vegetables, cereals, meats, eggs, sugars, fats, legumes)
- 7. Suitable foods for camp life
- 8. Preservation of food
  - *a*) In camp
  - *b*) In the home
    - (1) Canning
    - (2) Drying
    - (3) Curing meat

II. *Laboratory work with foods*
- 1. Desirable utensils
  - *a*) Names
  - *b*) Care
  - *c*) Minimum for outdoor cooking
- 2. Camp cooking.
  - *a*) Open-fire cooking of a desirable camp meal
  - *b*) Packing camp food
  - *c*) Protecting camp food
  - *d*) Camp dishwashing

When the boys were told that this week of experiment was to be conducted, one of them remarked, "I'd like to learn how to break an egg into a skillet without bursting the yellow and getting the pan full of shells."

This boy had been left at home at some time to cook the "bachelor's meal" of bacon and eggs for his father and himself, but he was unable to prepare this satisfactorily. Many times men are called upon to prepare a meal for themselves. For this reason it would not be amiss to give the boys some little information and some practical experience in getting a simple meal.

III. *Information to be gained about clothing*
- 1. Choice of styles to suit the wearer
- 2. Materials used in suits
  - *a*) Qualities
  - *b*) Common deceptions as to quality
  - *c*) Tests for woolen fabrics
  - *d*) Colors most apt to fade
  - *e*) Weaves that tear easily
  - *f*) Trade names of woolen fabrics
- 2 Materials used in socks
  - *a*) Comparative wearing qualities
  - *b*) Care of socks
- 4. Methods of preserving shape and appearance of garments
  - *a*) Removing spots and stains from suits
  - *b*) Pressing suits
  - *c*) Cleaning neckties
  - *d*) Sewing on buttons

All of these points can be well illustrated in the laboratory. Samples of the different kinds of suiting materials can be displayed and named as their several qualities are discussed. How to detect common deceptions can be illustrated by having the deceptive material for the boys to examine and compare with the genuine material. The various materials used in socks and stockings should be on display and the methods used to detect the various materials could be explained. How many boys can discriminate between fiber silk and pure silk? How many know what is meant by "mercerized"? A knowledge of these things will make the boys more critical buyers when they go to purchase socks.

A demonstration of spot and stain removing could be given in the laboratory. The boys could each bring two or three neckties and clean and press them as individual laboratory work. Each boy could press a pair of trousers, a coat, or a whole suit, and certainly every one of them should demonstrate his ability to sew on a button.

The boys of the beginning manual-arts class are usually at that age when they take little thought for their appearance. Often they do not know how to take care of their clothes, for there has been no one in the home who was competent to show them how to do it. A little instruction and laboratory work along this line may lead to marked improvement in the appearance of certain of the high-school boys.

The instructors who carried on this experiment are very well pleased with the results obtained. They feel that the time was profitably spent, and they also feel that another week spent in similar activities would be of much value to both boys and girls. They heartily recommend that every high school in the state try a similar scheme of cooperation.

CONCRETE WORK DONE BY THE GENERAL SHOP CLASS AT THE INDIANA STATE NORMAL TRAINING SCHOOL, TERRE HAUTE, INDIANA, UNDER THE DIRECTION OF MR. SYLVAN A. YAGER.

PRACTICAL PROBLEMS OF THE ELECTRICAL COURSE FOR THE JUNIOR HIGH SCHOOL[1]

B. B. Burling, Head of the Electrical Department, Boys' Technical High School, Milwaukee, Wisconsin

THE WEALTH OF MATERIAL available for the electrical course in the junior high school is unlimited. A proper sequence of projects, methods of approach, and limitations of the work are essential to its success. Before attempting to set down a list of suitable projects, it is advisable to have clearly in mind the immediate and wider aims of the manual-arts work.

A Guide Based on Safety

Many of the fire insurance companies and city electrical-inspection associations have within the past few months passed resolutions which might well be used as a guide in determining what work should not be attempted in the lower high-school grades.

The following *safety hints* which appeared recently in one of our metropolitan papers is only typical of the attitude taken by the safety commissions of our larger cities:

"Accident and sometimes death that follow the careless use of electricity may be minimized, if not avoided entirely, by observance of certain precautions.

"Don't tinker with bare wires, even in your own home.

"Don't leave the cord attached to the electric iron while you discuss neighborhood issues over the back fence.

"Don't use the electric vibrator when you're in the bathtub.

"Don't hang lampcords over a nail. Frayed insulation may mean a short circuit.

"Don't hang lampbulbs against wooden walls or partitions. And don't cover lampbulbs with tissue paper, or use them thus in store windows. Confined electric bulbs produce intense heat. Heat produces fire.

"*Don't use homemade electrical devices, especially heaters. Most homemade electrical apparatus is faulty in construction.*"

The above don'ts are merely a reflection of the nation-wide survey recently made by the Society for Electrical Development in order to determine the actual electrical causes of fire in the United States. The report is exhaustive so only the results of the investigation which are pertinent are listed below.

Causes of Fire	Per cent of electrical causes
Electric irons	14½
Carelessness and abuse	7
Bridging fuses, etc.	5
Defective equipment	3½

Naturally these facts are suggestive of the necessity of safety instruction in connection with a study of the proper use of standard equipment.

In the light of the above facts, should it not be the duty of the schools to follow as closely as possible the trend of scientific investigation and recommendation? Our attitude has often been to keep on doing the same thing, in the same old way, instead of studying out new and better methods. The *best commercial practice* should be our motto.

The Nature of Electrical Jobs

Another point for consideration before listing suitable projects for the junior high school is the nature of the jobs to be performed. The idea of having every manual-arts shop produce some article or articles to "show off" what the shop is doing is being modified to conform more nearly with trade practices. Some of these projects may call for the making of articles, while others may involve the repair, replacement, adjustment of old, or the installation of new equipment.

In bench metal work, cabinetwork, printing, patternmaking, and machine work, the commercial projects are largely of a manufacturing nature. On the other hand, the auto-mechanics work is not one of manufacture, but one of repair, replacement, and adjustment. The electrical trade is likewise not, strictly speaking, a manufacturing trade, for the work is largely repair, replacement, and installation.

With the above restrictions, it would at first appear difficult to secure suitable material for a course in electricity, but a thorough familiarity with commercial work will reveal many projects that might possibly be included in the junior-high manual-arts course without resorting to the making of coils, heating units, toasters, batteries, motors, etc. (The making of *simple* articles may be included as special problems, but should not dominate the entire course.

Suggestions for Laying Out Electrical Jobs

The following rules have been suggested to satisfy restrictions placed by inspection and safety commissions, and at the same time comply with modern teaching practice:

1. Progress slowly from lower to higher voltage jobs, as the age and understanding of the pupil permit.
2. Develop jobs which deal with the proper use of domestic and commercial equipment.
3. Develop jobs which deal more with the care, repair, and replacement of electrical equipment in the home than with the actual wiring of houses, until the pupil has definitely determined to specialize in the electrical trade.
4. Offer optional construction projects which are within the ability of the pupil to comprehend. It is suggested that these be used as rewards for the satisfactory completion of certain required work. As a further reason for placing the optional work last, attention is called to the following:

1. The pupil does not remain in one shop for any length of time; therefore the courses offered should be in distinct units of required work. (Optional work may be added as time permits.)
2. The pupil has an added incentive to finish the required work as quickly as possible.
3. The pupil is less likely to leave the class at the end of the semester without having completed the required shop and related work (the minimum essentials).
4. The variety of time schedules used in the junior high schools demands a flexible course which fits into the system in use.

The First Semester Course

In the junior high school, the first semester course (7B) should include projects to be used on low-voltage circuits, as well as projects involving minor replacements. The exploratory course in grades 7A, 8B, and 8A will include typical trade problems, involving the wiring of circuits, the repair of standard electrical appliances, and the replacement of existing equipment. The course for the tentative trade-selection period (9B, 9A) should include projects or jobs involving the actual installation of apparatus and systems requiring a thorough knowledge of circuit wiring.

Having adopted a feasible basis for the selection of suitable sequential projects, the following list of required and optional problems is offered for the first-semester electrical course:

First-Semester Course in Electricity

1. Making a Western Union splice.
2. Making a branch splice.
3. Wiring a single-bell circuit.
4. Wiring a door-trip circuit (same as used in small stores).
5. Wiring a bell system where a bell is controlled from two places.
6. Wiring a bell system where one button will ring two bells connected in parallel.
7. Wiring a front-and-rear-door-bell system for a single residence.

[1] Mr. Burling has at various times acted as instructor of vocational and engineering courses in electricity conducted at the University of Wisconsin Extension Division at Milwaukee. He recently completed a course and has been employed in a similar capacity by the same institution for next year.

8. Wiring a front-and-rear-door-bell system for a duplex residence.
9. Wiring a three-wire return call-bell system.
10. Wiring a night-bell system controlled by a push button and battery switch.
11. Adjusting a vibrating bell for a battery system; for a transformer system.
12. Rejuvenating a dry cell for use on a bell circuit (may be used as a home project).
13. Wiring a simple telegraph system to be used between two individuals.
14. Wiring a simple-series telephone system suitable for apartment or domestic use.
15. Tinning a soldering copper.
16. Soldering and tapping the Western Union splice.
17. Testing and replacing burnt-out fuses.
18. Testing and replacing burnt-out lamps.
19. Reading an electric house meter.
20. Repairing electric bells furnished by the students.
21. Repairing electric toys furnished by the students.
22. Testing and caring for the radio and auto storage battery.
23x. Making a fuse tester.
24x. Making an extension cord for the automobile.
25x. Making a crystal radio set.
26x. Making a single-tube radio set.

The jobs marked "x" are extra problems to be used as home projects, or as rewards for satisfactorily completing the required work.

The Second-Semester Course

The second-semester work should be of a distinctively exploratory nature. Definite information should be given relative to the electrical trade, and the projects to be selected should involve a more advanced study of low-voltage circuits and the simpler problems of the tradesman in replacing and repairing electrical equipment.

Second-Semester Projects in Electricity

1. To install a duplex-bell circuit.
2. To connect a door opener.
3. To install a gravity-drop annunciator in a residence to indicate front, rear, dining room, and bedroom.
4. To install a front-and-rear-bell system, using a ground return.
5. To install an open circuit burglar-alarm contact for doors.
6. To install open-circuit burglar-alarm contact for windows.
7. To test for shorts and repair bell circuits.
8. To use a solder cup in soldering strands of flexible wire.
9. To make, solder, and tape a rat-tail splice.
10. To replace an extension-cord lamp socket.
11. To replace an extension-cord plug cap.
12. To replace an appliance extension-cord plug cap.
13. To replace an appliance plug.
14. To install a feed-through switch.
15. To replace a fixture socket.
16. To install and adjust a socket thermoflasher.
17. To test and adjust a Ford spark coil.
18. To repair electrical heating devices furnished by students. (Do not make heating units. Replace any burnt-out unit with an approved standard element.)
19x. To make a series Christmas-tree lighting outfit.
20x. To make an appliance-extension cord.
21x. To make a lamp-extension cord
22x. To make a chemical-trickle charger for "A" or "B" battery.
23x. To make a three-tube radio set.
24x. To repair one- and three-tube radio sets furnished by students.

In the above it will be noticed that "motors" are not included. Years of experience have demonstrated that the average pupil of the junior high school is incapable of understanding the principles underlying the operating of motors or generators. For this reason these are considered as class-demonstration projects and should be presented near the end of this section of the work. Throughout the second semester course, it will be noticed that there is nothing which leads to tampering with the house circuits. On the contrary, the classwork given in connection with the course instils respect for lighting and power circuits and a knowledge of the simpler code rules.

Where a pupil transfers from the electrical shop to some other shop for specialization, the information which has been gained will assist him in maintaining the electrical equipment about the home without violating city, state, or national codes. This course is, in other words, largely *informational*.

The Third-Semester Course

The next course which logically follows this informational period is intended for the one who has made a tentative selection for his lifework. This requires a more intensive study and application of the knowledge of circuit wiring. More advanced problems in bell and lighting circuits are suggested with constant reference to the code rules.

Third-Semester Projects in Electricity

1. To install a series-bell system. (Test and adjust for proper operation on battery and transformer systems.)
2. To install a complete three-apartment-house bell system, including front, rear, janitor call, and door opener.
3. To install a manually-reset needle-annunciator for elevator service. (Test on a.c. and on d.c.)
4. To install an automatically reset needle annunciator for residence service. (Test on a.c. and on d.c.)
5. To install a return call-bell system, controlled by two return call push buttons.
6. To install a three-apartment-house system, including front, rear, dining room, and bedroom annunciator, janitor annunciator and door opener.
7. To install a constant-ringing relay in connection with a single-bell system.
8. To install a three-apartment, janitor-annunciator return-call system, using common push buttons.
9. To install a three-apartment, janitor-annunciator return-call system, using return-call push buttons.
10. To install a constant-ringing relay and bell in connection with a janitor annunciator.
11. To install a master push button to operate four-bell circuits simultaneously. Use return-call buttons for circuit operation and a common push button for the master.
12. To install a four-circuit master push button to operate four circuits simultaneously. The individual circuits are controlled by common push buttons.
13. To install two automatic-reset annunciators in parallel.
14. To install momentary-contact relays in conjunction with bells which are located some distance apart.
15. To install momentary-contact relays in conjunction with telegraph sounders in a telegraph system of two stations.

NOTE: Many other problems in *bell circuits* might be suggested. The above, however, cover the most useful combinations of existing apparatus. The next three problems are indicative of other combinations which are not as practical, yet are of value as extra or test problems.

16x. To install a two-bell circuit, controlled from two common push-button stations. (May be used as a return-call system.)
17x. To install an extension bell (for night duty only) from an already installed single-bell system. Bells to operate in series.
18x. To install an extension bell (for night duty only) from an already installed single-bell system. Bells to operate in parallel.
19. To connect a cleat receptacle to be controlled by a single-pole snap switch. (Open wiring—use cleats and knobs to support wires.)
20. To connect a cleat receptacle, to be controlled by a double-pole single-throw knife switch.
21. To connect a cleat receptacle to be controlled by a double-pole snap switch.
22. To connect two-cleat receptacles in series and controlled by a single-pole snap switch.
23. To connect two-cleat receptacles in parallel and controlled by a single-pole snap switch.
24. To connect a cleat receptacle so that it can be controlled from two points, using three-way (S^3) snap switches.
25. To connect an entrance switch cut-out for a system of two-cleat receptacles each controlled by a single-pole snap switch.
26. To connect a cleat-receptacle so that it can be controlled from three points using two three-way and one four-way snap switches.
27. To connect a cleat-receptacle so that it can be controlled from four points using two three-way and two four-way snap switches.
28. To connect a cleat-receptacle so that it can be controlled from two points, using four-way snap switches.
29. To connect three cleat receptacles so that they can be controlled by an electrolier snap switch.
30. To connect two-cleat receptacles so that a three-way switch can throw on the receptacle desired and a single-pole snap switch to control the entire system. (Typical system for photographic developing room.)
31. To connect a single-pole snap switch in a two-point control system, so that it can be used as a master switch.
32. To find the wattage and the number of electric lights used in the pupil's home. Calculate the cost if all lights were used for three hours a day for a month of thirty days. (Assume cost of electricity is ten cents per kw. hr.)
33. To draw a plan of your (pupil) residence, showing location of all outlets for electric service and draw a wiring layout for the complete electrical system.
34. To repair electrical appliances furnished by the pupil.
35. To find the wattage of appliances used in the pupil's home and calculate the cost of operating each appliance for one hour.
36x. To make a bell-ringing transformer.
37x. To repair electrical appliances of the motor type furnished by the pupils.

Advanced Electrical Work

At the completion of this course, the pupil should be adequately prepared to proceed directly into house wiring. The advanced work will include a complete course in knob-and-tube wiring, molding wiring, rigid-and-flexible steel conduit wiring, armored cable wiring, fixtures, motor installations, and meter wiring.

It is advisable, wherever possible, to supplement the required shopwork with correlated academic instruction. A general plan for this correlation is suggested below: (The related academic work may in some cases be given in part by the shop instructor, but in most cases by those instructors who follow a definite schedule with the shop teachers.)

JUNIOR HIGH SCHOOL—ELECTRICITY—1

ORGANIZATION OF SHOP INSTRUCTION								RELATED INSTRUCTION				
Job Number	Name of Job	Purpose	General Explanation	Apparatus and Materials	Detailed Instruction	General Electrical Knowledge	Questions	History Civics Geography	Civics	Arithmetic	English	Science

SUGGESTED FORM FOR ANALYZING SHOP INSTRUCTION IN JUNIOR-HIGH-SCHOOL ELECTRICAL COURSE.

To illustrate this plan, the topic of "insulators" may be handled in the following manner:

Shop Class: Equipment and supplies are examined to find how, why, and what insulation material is used.

Geography Class: The sources of well-known insulating materials as rubber, porcelain, mica, and pitch are located.

Civics Class: The importance of such materials to our civilization in the protection of life and property is studied, as well as the methods of transportation used in obtaining the raw materials.

English Class: "The uses of insulating materials" is taken care of in the composition work and the names of common materials are used in spelling.

Science Class: Insulating substances are tested to show their suitability for different classes of service.

Summary

In conclusion, the outstanding advantages of the course as recommended are:

1. It provides for the type of projects which fit into boyish characteristics.
2. It provides projects which are within the range of the pupils' interest and ability.
3. It provides a course which meets the demands for more safety instruction in our schools.
4. It provides a course which contains incentive in the nature of interest and reward.
5. It provides a course which is sequential in the order of difficulty.
6. It provides a course which does not conflict with the best thought of electrical organizations.
7. It provides a course which is in agreement with the official action taken by the associations of electrical inspectors.
8. It provides a course which is adapted to the fundamental philosophy of the junior high school.
9. It provides an informational course which is unlimited in extent; at the same time the work done by the pupil is within the range of his understanding and ability.

SCHOOL PRINTING IN THE UNITED STATES

F. C. Lampe, Chicago, Illinois

(Continued from July)

Printing as a Manual-Arts Subject

It may be well at this point to take up the organization of printing courses in public schools, as a form of manual training or manual arts. In 1890 handwork as an element in the education of the young was not new; it had been advocated hundreds of years before. But printing had not been considered a possible form of handwork for educational ends prior to that year. Woodwork was taught in practically all American public and private schools where manual training was included in the curriculum.

The earliest record I can find of printing as a manual-arts subject, comes from Harry E. Wood, director of vocational education, Indianapolis, Ind. The date is December 5, 1890, when the committee on supplies of the board of education recommended the purchase of printing presses and materials at a cost not to exceed $350. A bill of $260.10 paid to Barnhart Brothers & Spindler on April 3, 1891, and an entry of $304.30 in the annual report of the secretary of the Indianapolis school board, under date of July 6, 1891, shows that printing was started in Indianapolis more than 35 years ago. Mr. Wood undertook to teach the subject in addition to mechanical drawing and woodworking. The outfit was very small. In setting up a graduation program, not sufficient type was available, and spaces and quads were used in place of some letters, necessitating a double run on the press to print in the missing letters. Such were the difficulties under which printing was started in this school.

Mr. Wood has a cherished photograph of his printshop as it appeared in 1905, in School No. 9. This picture was taken by Prof. Ben Johnson, then supervisor at Seattle, Wash., who was much impressed with what Mr. Wood was doing and wanted to present convincing evidence of the educational value of printing to his board. On the basis of the photograph and samples of work printed by the boys in Mr. Wood's school, Mr. Johnson was able to start printing in the Seattle public schools. There are now twelve well-equipped printing centers in Indianapolis, where full-time teachers are employed, and nearly 1,500 students are enrolled in the printing classes. In addition to the grade-school printshops, vocational printing is taught in the Arsenal Technical High School. The Washington High School and the Shortridge High School will shortly have printing equipments costing between $4,500 and $7,000.

Mr. J. J. Plum, now in charge of the printing department of the Chicago board of education, has the distinction of being first among the educators of Chicago to advocate that printing be taught as a school subject. It was in 1896, according to Mr. Plum, that the city of Chicago took over the Cook County Normal School. A small printing outfit was available in the school, printing being taught mainly as an outline. Mr. Plum was the instructor. Printing is now taught in most of the Chicago high schools, in each of the junior high schools, and in a number of the grammar schools.

Cleveland, Ohio, opened its first school printshop in 1907 with two presses, a cutter, and type and materials which cost about $800. The outfits installed in schools since then are larger. Printing is taught in 25 schools at the present time. The classes average 32. Mr. Webster was the first instructor.

Printing with the Gary, Ind., school organization really had its beginning at Buffton, Ind., where Supt. William A. Wirt and Vocational Director G. E. Wulfing carried on schoolwork before going to Gary. The equipment in that town consisted of a pilot press, a small paper cutter, a few cases of type, and other necessary items. The first school printing in Gary was undertaken in 1907. In 1910 an outfit was bought for the Emerson School and a few years later a similar outfit was placed in the Froebel School. Later these two outfits were combined into one plant at the Emerson School. The outfit now invoices approximately $10,000.

In December, 1908, the first press was installed in the Canton High School, Canton, Ill. Additional equipment was added in 1924. There are 35 boys enrolled in the printing work. Mr. C. E. White was the first instructor.

A course in printing and bookbinding was started in the Preapprentice School, Boston, Mass., in 1909, William F. Kenefick, instructor. A so-called prevocational class was started April 1, 1912, with Edward D. Dee as instructor. Sufficient equipment for 15 students was purchased. The two outfits were identical. Printing is now taught in the Continuation School, the Boston Trade School, the Hyde Park High School, and in 13 intermediate schools. The vocational classes are made up of 15 to 18 students. The intermediate type of instruction is conducted with classes of 18 to 22 students.

At Steele High School, Dayton, Ohio, a printing class was first organized in 1910, with John Chambers as instructor.

The equipment was meager, consisting of a small Chandler press, two type cases, type, a small quantity of necessary materials, and three library tables. Four schools are now equipped to teach the subject of printing. Classes range in size from 12 to 24, and are taught 6 periods a day of 42 minutes each.

Printing was first introduced in the high school at Vancouver, Wash., about 1910, the late George H. Brackett being the first instructor. The equipment was sufficient for classes of 20 boys. The students print practically everything needed for the schools. Supt. C. W. Shumway says: "We would be very much lost without our printing department." In connection with publishing the school paper, a course in journalism is provided. Several boys have entered the newspaper field as a result of taking the printing course.

Printing was first taught in Jersey City, N. J., in 1910. Three schools are now equipped to teach the subject.

About 1912, printing was introduced into the Atlanta Technological High School. The department was popular from the beginning, and grew rapidly until at the present time two instructors are employed. The work is divided into two parts, the composing room and the pressroom. When the success of the printing subject in this school had been established, a department was opened in the Technological High School which inventoried about $20,000. The latter school produced a great deal of the printing for the board of education and for the schools in the Atlanta system.

In 1924 printing was introduced into the junior high schools of Atlanta, with full-time teachers in each. There are now four such schools. Very little work is done by the junior-high-school classes for the board of education, but the students furnish practically all the forms, records, etc., for their respective schools, and each prints its own paper. A number of the students finishing the printing course at the Technological High School have gone into the printing trade. Many of the students who finish the junior high school go into the senior high and specialize in printing, eventually finding themselves in commercial shops. The schools cooperate very closely with the printers' union of the city.

Columbus, Ohio, put its first printing outfit into the schools in 1914. Now 3 schools are equipped for classes of 20 students.

Cincinnati, Ohio, started classes in printing in 1915 in two schools, the Woodward and Hughes high schools. Mr. Fred Englehardt was the instructor in both schools. The equipment was the same in each school. Eleven schools and one trade school now offer printing. The classes range from 15 to 25.

Richmond, Va., offered a course of printing in the Binford junior high school in 1915. From time to time this outfit has been enlarged, but it is the only school so equipped in this city.

Toledo, Ohio, started printing courses in 1915. There are now two schools where printing is taught, a trade-school unit and a junior-high-school unit, with classes of 20 students.

The high school in Sioux Falls, S. Dak., started printing September 1, 1916, W. Herbert Roberts being the first instructor. Supt. A. A. McDonald claims that the study of printing has been successful from the beginning, and that the training the students receive in the printshop in accuracy, system, spelling, composition, paragraphing, etc., is most important.

San Diego, Calif., first offered printing in 1917. There are now 5 schools equipped for classes of from 10 to 25 students.

Burlington, Vt., in 1917 installed an outfit in the junior high school, sufficiently large enough to provide instruction for classes of from 30 to 40 students. A. X. Dorman was the instructor.

The printing plant in South Dakota State College, at Brookings, was established in 1918, Seth Thornton being the first instructor. In the beginning the equipment was small, but the department has grown until now an average of 35 students are enrolled in the printing course. The four-year course follows the required curriculum of the general science division, but gives the student his major work in printing, or in rural journalism, or both.

Los Angeles, Calif., claims 1918 as its starting point. Mr. Grunup, of the manual-arts department of the Los Angeles high school, was the first instructor. They now have 40 schools where printing is taught—all the senior and most of the junior high schools offer the work. An average of 18 students is enrolled in the classes.

The North Central high school is the only school in Spokane, Wash., where printing is taught. The work was started in 1918 by Ernest E. Green as the instructor. Supt. Orville C. Pratt says that the work has been quite successful and has grown since the time it was first inaugurated.

Salt Lake City, Utah, started in 1921, only one school having printing. W. R. Astler has been the instructor from the beginning. The outfit is quite complete, costing $9,000.

Wilmington, Dela., put in printing in 1924. The instructor was Frank P. Hall. The classes are 16 in the vocational department and from 20 to 25 in the industrial-arts department.

(To be continued.)

AN OLD VOCATIONAL SCHOOL.
The School for Banana Culture, Fumban, Cameroon, French West Africa.

A PLAN FOR RATING MECHANICAL DRAWINGS

Harold E. Schofield, Supervisor, Philadelphia, Pennsylvania

THE INVESTIGATION of which this paper is the record, was the result of a longfelt need for a suitable plan for rating mechanical drawings. Such a plan, to be valuable, must be broad in its scope, representative of the best thought in this field, and easy to use.

The first step in the investigation was to separate into definite factors those qualities in a mechanical drawing which contribute to its success. A careful survey of twenty well-known textbooks on mechanical drawing and numerous group discussions resulted in the choice of the following five factors:

1. Completeness and suitability.
2. Accuracy of drawing.
3. Conformity to good practice.
4. Judgment used in making the drawing.
5. Technic, or skill, in using drawing tools.

At first glance, there may seem to be some overlapping in these terms, but a careful study of the definitions given below will show clear lines of demarcation between them.

Two hundred questionaries were sent out. They were addressed to all sections of the United States, some going to teachers of mechanical drawing, some to supervisors and university professors, and some to engineers. One hundred and two replies were received and tabulated. From these tabulations the means were calculated and the plan was arranged. The proportional diagram, which is offered for use in applying the plan to any drawing, is a graphic means for securing greater accuracy and saving time.

The investigation was purely inductive. The purpose was to collect existing information and opinions, not to create new policies.

DEFINITIONS OF TERMS USED IN THE TABULATIONS

Rating, sometimes called mark or grade, is the degree of perfection achieved in making that drawing, based upon the per cent scale. In using this scale, 100 indicates perfection and 0 indicates no value.

Teacher—M.D., indicates those persons actively engaged in teaching mechanical drawing. *Educator* indicates all persons engaged in educational work, except teachers of mechanical drawing. *Engineer* indicates all persons, not included in the above groups, whose daily occupations bring them in touch with the making or using of mechanical drawings.

Maximum is the greatest value assigned to that column by any person. *Minimum* is the least value assigned to that column by any person. *Mode* is the value assigned to that column by the greatest number of persons. *Mean* is the assigned value which lies halfway between the minimum and maximum, if all the assigned values are placed in order according to their amount. *Corrected Mean* is the mean with fractions removed and so adjusted, that the sum of the means of the five factors will equal 100.

Description of the Factors
First Series

Column No. 1, Completeness and Suitability. Completeness and suitability in a drawing is the factor or quality which makes the drawing a complete answer to the given problem. Unfinished work and the omission of physical features of the object would be penalized under this head. But the omission of a line or a series of lines in one view only should be considered an error in projection, and would be penalized under "accuracy." Factor No. 1 deals with the elements of the design rather than with the actual expressing of that design on paper. Failure of the parts of a machine to fit properly when assembled, as shown in a detail drawing, would be a fault in design, and would be penalized under factor No. 1.

		1 COMPLETENESS	2 ACCURACY	3 CONFORMITY	4 JUDGMENT	5 TECHNIQUE	A TIME REQUIRED	B ABILITY TO VISUALIZE	C INDIVIDUAL IMPROVEMENT	D SELF RELIANCE	E INDUSTRY & EFFORT	F SCHOOL SPIRIT	G EXTRA CURRICULAR ACTIVITIES
TEACHER M.D.	MINIMUM	5	0	0	5	10	0	0	0	0	0	0	0
	MAXIMUM	70	60	20	40	45	5	5	5	5	5	2	2
	MODE	20	20	10	10	10	3	3	4	3	2	0	0
	MEAN	25	20	10	15	15	3	4	3	3	2	1	0
	CORRECTED MEAN	29	23	10	18	18							
EDUCATOR	MINIMUM	20	3	1	3	3	0	3	0	0	0	0	0
	MAXIMUM	87	40	25	30	20	3	5	4	5	4	1	1
	MODE	30	20	10	23	10	3	4	3	3	3	0	0
	MEAN	30	15	10	20	10	3	4	3	3	1	0	0
	CORRECTED MEAN	35	18	12	23	12							
ENGINEER	MINIMUM	10	10	0	5	2½	0	2	2	0	0	0	0
	MAXIMUM	65	50	15	32	50	5	5	5	5	5	3	1
	MODE	50	20	10	20	10	3	3½	3	3	2	0	0
	MEAN	31	28	10	18	10	3	3½	3	3	1¼	0	0
	CORRECTED MEAN	32	29	11	18	10							
ALL CLASSES	MINIMUM	5	0	0	3	2½	0	0	0	0	0	0	0
	MAXIMUM	87	70	25	40	50	5	5	5	5	5	3	2
	MODE	20	20	10	20	10	3	3½	3	3	3	0	0
	MEAN	30	20	10	20	15	3	4	3	3	3	0	0
	CORRECTED MEAN	32	21	10	21	16							

FACTORS FOR JUDGING MECHANICAL DRAWINGS AND TABULATION OF REPLIES TO THE AUTHOR'S QUESTIONARY.

Column No. 2, Accuracy. Accuracy is that quality in a drawing which is characterized by correctness, precision, and freedom from errors of projection and scale. This group does not include errors of judgment in conceiving the design, or in arranging the chosen design on the paper. Care must be used in differentiating between accuracy and technic as defined in this pamphlet.

Column 3, Conformity. Conformity is that quality in a drawing which shows it to be in conformity with good drawing-room practice. Care must be used to adopt suitable standards for comparison in rating the drawings. Remember that there are many good drawing rooms throughout the country in which minor differences in practice exist. A teacher of mechanical drawing, in rating the drawings of his students, may use as his standard those practices which he has prescribed for use in his own classroom, but when rating the drawings of persons with broader training, a broader standard must be chosen.

Column No. 4, Judgment. Judgment, in the present rating plan, is that quality in the drawing which shows the wisdom of choice in matters such as necessary views, placing those views, necessary dimensions, placing those dimensions, and the quality which corresponds to composition in art. This group is not concerned with the actual conception of the design, but with the way that design is portrayed on the paper.

Column No. 5, Technic. Technic is that quality in the drawing which is characterized by clean paper, clear definite lines, and clearly defined corners. It is that quality which corresponds to the quality and condition of metal type and the mechanical skill used in printing in bookwork. Quality of lettering, dimension figures, and arrowheads are considered

under this factor, but the choice of words to be lettered, and where they are to be placed, must be considered under other topics. The thickness or weight of lines on inked drawings, would come under judgment, not under technic.

Description of Factors[1]

Second Series (affecting student work only)

Factor A, Time Required. The speed with which the student handles the drawing tools.

Factor B, Ability to Visualize. The ability of the student to visualize mentally the object described by a finished drawing, or to visualize the object from specifications so that he can describe the object on drawing paper.

Factor C, Individual Improvement. The improvement in the work of the individual student as a result of training.

Factor D, Self-Reliance. The ability and inclination of the student to work out his own problems instead of depending on help from the teacher or his classmates.

Factor E, Industry and Effort. The tendency of the student to work steadily, and avoid unnecessary delays.

Factor F, School Spirit. The tendency of the student to cooperate with the school authorities for the general good of the school.

Factor G, Extracurricular Activities. The participation of the student in extracurricular activities and school athletics, for which no credit is given toward graduation.

Tabulation of Replies

The values assigned to the first series of 5 factors are expressed in per cents, the sum of the 5 in each case totalling 100 per cent.

The values assigned to the second series of 7 factors, which are not part of the drawing, but which might affect the rating given student work, are expressed in the 5-point scale. This scale ranges from 0 for no consideration, to 5 for those things to which that person would give great consideration.

The summaries in Figure 1 are first given for the three groups of persons mentioned above, and then expressed for the entire group. This grand summary is the one used in the final analysis. The group summaries are used for the purpose of comparing those groups.

The Plan

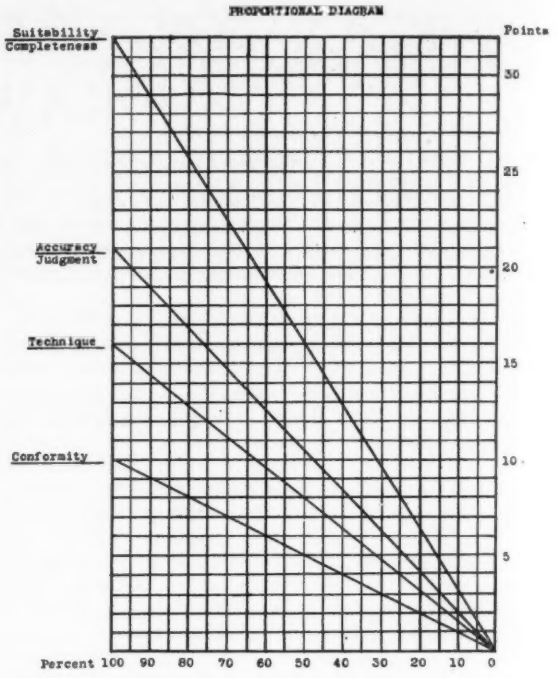
The consensus of opinion obtained by combining the answers to the questionaries is as follows:

Factors	Percentages
No. 1—Completeness and suitability	32
No. 2—Accuracy	21
No. 3—Conformity	10
No. 4—Judgment	21
No. 5—Technic	16
Total value of drawing	100

The Proportional Diagram

In order to facilitate the use of the suggested rating plan, a proportional diagram has been drawn. This permits one to judge each individual factor on the basis of one hundred per cent for perfection, and to translate the value thus obtained into its correct value based on the importance of that factor as prescribed in the plan. The use of the diagram eliminates the need for mathematical calculations. Let us consider the factor of technic as an example. If the drawing is absolutely perfect from the standpoint of technic, the scale prescribes 16 points of credit toward the final rating. The accepted concept of perfection is 100 per cent, so we will judge technic on this basis. Suppose the technic of the particular drawing at hand is valued at 70 per cent of perfection; enter the proportional diagram at the base, on the vertical line marked 70 per cent, run up this 70 per cent line to the point where it intersects the oblique line marked "Technic." From this point of intersection move horizontally to the right until the right-hand side of the diagram is reached. Read the value in points, in this case just 11 points.

[1]These seven factors are not definite characteristics of a mechanical drawing, but many teachers consider them in their term grades, if not in the rating of individual problems.



A SIMPLE MEANS FOR SCORING DRAWINGS ON THE BASIS OF THE AUTHOR'S STANDARDS (See Text).

Let us now consider all the factors of the drawing and compute the complete rating:

Factor No. 1—75% perfect	24 points[2]
Factor No. 2—85% perfect	18 points
Factor No. 3—80% perfect	8 points
Factor No. 4—90% perfect	19 points
Factor No. 5—75% perfect	12 points
Rating of this drawing	81 per cent

Discussion of Factors of Drawing

Under Factor No. 1—Completeness and suitability, the values assigned in the returned questionaries vary from 5 per cent to 87 per cent, although over half of them lie between 15 and 30 per cent. The corrected means are:

Teacher, M.D.	29
Educator	35
Engineer	32

The comparison of these three means brings to light a very interesting situation. Teachers of mechanical drawing are constantly faced with the problem of maintaining high standards of technic and accuracy in the work of their classes. They instinctively place a high value on these factors, reducing the value left to be assigned to Factor No. 1, which represents the design feature of a drawing. This reduction of the value assigned to Factor No. 1 may also result in part from the fact that the actual per cent of perfection achieved under Factor No. 1 is harder to determine than the corresponding per cents under the other factors. It is a very human tendency to subordinate the importance of these things which are difficult to achieve.

In contrast to the above, those persons concerned with education, but not directly responsible for the actual classroom work, assign more value to Factor No. 1 because it represents, better than any of the other factors, the training of the mind and the broadening of the field of vision. This viewpoint is directly in accord with the general trend of modern education.

The engineers have taken their stand halfway between the other two groups. This is the definite result of their life training, and not in any way indicative of a lack of initiative or thought on their part. They are concerned equally with

[2]Use the nearest whole number of points in each case as it is not possible to judge the value of a drawing accurately enough to use fractional parts of points.

the value of the design and with the satisfactory portrayal of that design on paper.

Under Factor No. 2—Accuracy, the corrected means are:

Teacher, M.D.	23
Educator	18
Engineer	29

In this group the educators assign the lowest value. To them accuracy is simply a phase of handwork, and is accordingly given a lower place. The teacher of mechanical drawing, with the difficulties of his classroom practice well in mind is next higher. The engineer, to whom accuracy means success and the acquisition of money, assigns the highest value by a large margin.

Accuracy, or the lack of it, in a drawing, is probably the result of the draftsman's previous training. Certainly some persons acquire a satisfactory degree of accuracy with less training than some persons require to achieve the same degree of proficiency. But all normal persons can be trained to do satisfactory work if they are willing to accept that training. I have taught some boys who seemed unable to realize that accuracy is essential to a good drawing. Inaccuracy may be due to this lack of realization, or to poor eyesight. Occasionally a boy will be too indifferent to put forth the effort required for an inexperienced person to make an accurate drawing, but fortunately for us such cases are rare, if the teaching process is what it should be. Certainly it is a characteristic which would permeate the draftsman's whole being. Human nature is plastic enough that any normal person can be taught to do reasonably accurate work, and anyone fitted in other ways to be a draftsman can acquire this desirable quality.

Under Factor No. 3—Conformity, the corrected means are:

Teacher, M.D.	12
Educator	12
Engineer	11

This shows a closer agreement than any of the other four factors. Conformity is necessary in any language. Without it ideas could not be transferred from one person to another with any degree of clearness. This necessity places conformity on the list of essential factors. But because it presents little difficulty either in the classroom, or in the industrial-drawing room, a relatively low value has been assigned to it.

Under Factor No. 4—Judgment, the corrected means are:

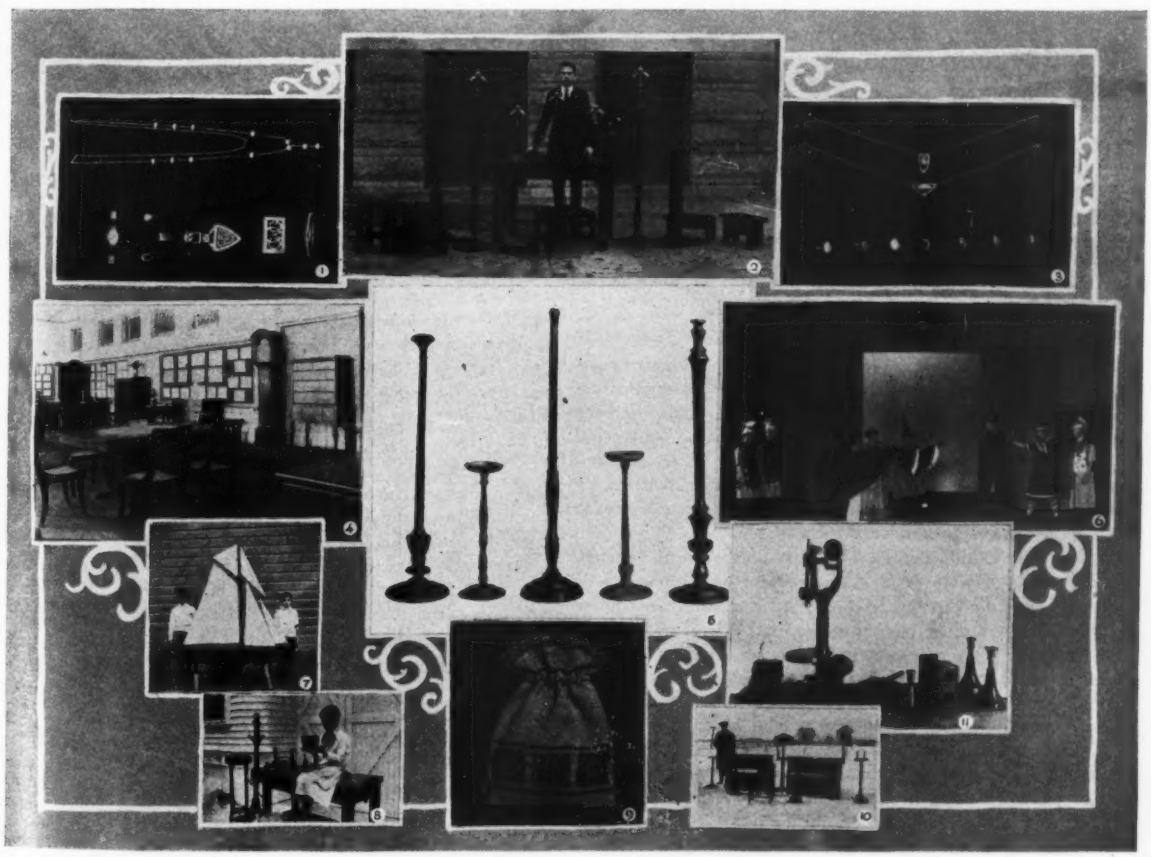
Teacher, M.D.	18
Educator	23
Engineer	18

The educators assign the highest value to this factor. No doubt this is the result of the same viewpoints which were discussed under Factors No. 1 and No. 2. Good judgment, to the educator, is indicative of progress and understanding, hence the higher value. The teachers and engineers agree, giving this factor 18 per cent.

Under Factor No. 5—Technic, the corrected means are:

Teacher, M.D.	18
Educator	12
Engineer	10

A comparison of these three assigned values brings out very clearly the viewpoints of the three groups which assigned them. The teachers, to whom technic offers an ever-present difficulty in their daily work, have assigned the highest value by a considerable margin. Educators, to whom technic is simply a necessary evil, have estimated the value of technic at two thirds the value assigned by the teachers. Engineers, who have little concern in this factor, have assigned the lowest value. To them it is less important because the process of selection and elimination has ordained that draftsmen as a group must be skilled in this type of activity. A would-be draftsman who has been proved unsatisfactory from this standpoint has found his existence so precarious that he turns to some other vocation.



SCHOOL SHOP PRODUCTS FROM FAR AND NEAR.

INDUSTRIAL-ARTS MAGAZINE

E. J. Lake S. J. Vaughn
Editors

EXPLORATION

To offer opportunities for exploration along industrial lines is generally recognized as an important objective of the organization of the junior high school. This recognition, as a rule, amounts to little more than a superficial smattering of this much talked about objective. That many industrial-arts departments are doing little or nothing in a broad way toward this objective can hardly be denied.

In many instances, industrial-arts classes report for shop-work and are given a limited number of projects to make in wood or metal. Repair jobs for the home and projects to motivate the student's interest are eagerly sought and introduced by all progressive instructors. These projects are justified if they create the interest and inspiration so necessary for successful exploration in the realm of industry and its workers. The tool processes and fundamental hand or machine operations covered, also play an important role.

Can these benefits, in themselves, be construed to possess the exploration values we wish to credit to our industrial-arts programs? Is this production of a few material projects to be taken as an end in itself, or merely as a means of creating an interest upon which we might capitalize by a study of occupations which will have the greatest exploration values?

The industrial-arts student should be acquainted with the subject in a general way, with its application to life, and with its benefits, to him as an individual in life's reality. This might be accomplished by making a few projects in the few shop activities possible in the modern city school system, but it does not seem reasonable.

Until we recognize the importance of class discussions on industrial work and opportunities; of taking off shop time to delve into the interesting sidelights in industry; of visiting industry, where work can be observed as it is really done; of organizing our courses to fit more logically all students and not only those preparing for trade work; and of capitalizing on the interest and inspiration aroused by our shop activities—the industrial-arts programs will not function as some of us would like to believe they are functioning.

THE SCOUTS AND THE INDUSTRIAL-ARTS TEACHER

It occurs to us that if there is one summer occupation to which the industrial-arts teacher is better adapted than another it is directing a summer camp of boy scouts such as we visited recently. This camp had been prepared by a score of older master-scouts under the direction of a leader who knew how to build anything, from a mess hall to a diving board, and who knew also how to handle boys in job lots to their great advantage and development.

Our visit to this camp was at the opportune time when the first shift of sixty boys were closing their two weeks of camp life with the ceremonies of a stunt show and awards for the best scout conduct during the period. We arrived just after dark of a starry night and were surprised to find the camp of ten open tents deserted, except for George the colored camp cook, who was busy with his work in the mess hall. George told us with apparent relief that "De boys am holdin a camp fiah cerimony ovah yonda." With a spotlight we found our way over the hill and through the woods where we looked down upon a scene of weird, wild delight such as our boyhood imagination could scarcely have conjured. Around the slopes of a natural arena, lighted by a roaring bonfire were seated sixty young savages in groups of ten. On one side was a group of ten or more master scouts and the "general."

As we took a back seat to see but not disturb the weird show, the general arose and solemnly announced that ten A would now put on their stunt. Ten young savages struggled into the lighted arena with such a conglomeration of pasteboard cylinders, wheels, piston rods and mechanical junk as they could lug, and without a word proceeded to assemble a gasoline engine. But, as usual with such ventures, they had a series of mishaps. From time to time they got a put! put! only to discover that "the flywheel was on the wrong side" or there was a "short in the incubator" or "the ash pan had burned out." We learned afterward that this was "on the general" who had some troubles in installing a gasoline engine to pump water. During the show the camp doctor, the camp cook, the camp inspectors, and the tenderfoot each came in for bitter satire. The camp doctor inadvertently left his gloves "inside" after a major operation and was seen looking for his umbrella after a second attempt. When the show was over the general announced that each scout would be blindfolded with his scout handkerchief and conducted to a mysterious altar in a far land where ceremonies would be held that would divide the goats from the sheep. We followed with our spotlight, over hill and dale, and some ditches that were not altogether dry, through the black night that made blinders needless, to a deep ravine where a second roaring fire had been built. Here the general made a fine speech that would impress any boy with the advantages of being a good scout rather than doing the thing indifferently, and enforced his speech by awarding merit badges for the good work done in camp. Craft work of various sorts, camp craft, athletics, swimming, archery, and various worthy deeds were awarded to the appreciative rah! rah! of sixty young savages with a final burst of savage acclaim for the general, which must have startled the owls and frogs for miles around with such and so much competition. Then a long but happy march back to camp and a bed under the stars.

The next day these sixty experienced scouts, freckled, tanned, but hardy and happy in their accomplishment were returned to their homes and a second group of sixty tenderfeet were started on two weeks of fun and play and work in the open. Could anything be more promising than this development of hardy, virile, and wholesome manhood?

Again we recommend boy-scout leadership to industrial-arts teachers. Such summer occupation will bring the tired teacher as near the fountain of youth as he may hope to get.

WHAT AND WHY

When classes for the new school year report for the first time it is the duty of the teacher to answer two important questions: (1) What is the subject, and how does it dovetail into the other subjects of the curriculum? (2) Why should you study this subject, and where can it be applied in life?

The answers to these questions will result in a foundation for what is to come; an added interest in the subject; a more receptive frame of mind on the student's part; a clearer conception of this educational tangle of studies, which at present seem to many students to have no definite connection; and a rather definite understanding of what benefit our studies will be to each student in his possible future calling.

It is not uncommon to find shop or mechanical-drawing instructors start the first lesson with a problem, leaving the important fundamental background for the student to supply through his own imagination or initiative. This can hardly be said to be the proper pedagogical approach.

The good history teacher impresses the application of past experiences to present-day problems and does not teach facts for the sake of facts alone.

The good industrial-arts instructor has the same responsibility. Mechanical drawing has a direct value as a language

training, applicable to almost every walk of life. Shop activities aim particularly at exploration, guidance, and general appreciation of industrial work and conditions. The material product of a drawing, a footstool, a hand clamp, or a repair job in a household mechanics course are by-products, not ends in themselves. These truths can be impressed upon the new student. To give this information is not only the privilege but the duty of the industrial-arts instructor.

The start of the new school year is the time to take stock; to think of the lack of interest, if any, in your classes of last year; and to make provision to start off on the right foot by answering the *what* and *why* for each and every subject you teach.

PAST—PRESENT—FUTURE

The completion of a "job," lesson, or day is recorded as past history; the time consumed by these things is the present; while the future is just waiting its possibilities for accomplishment. The past shows to us the possibilities for improvement, the present impresses us with the responsibility of being prepared to meet the uncertainty of time, while the future will prove the results of our constructive thinking and action.

The lives of our graduates, who have entered the complexities of the work-a-day world and are groping blindly many times for recognition, should be our guide for the success or failure of our courses or lessons. Our barometer of success is our product, the student. It is not how well a taboret, crankshaft, apron, or pie was made in school but what success has been attained after leaving school. The spoiling of a school "job" might mean more in training value than many articles well made. If the school training functions in preparing the student to think when new situations arise, we need look for no unfavorable criticism. If the ability to think constructively on the "job" has not been developed or acquired, we most certainly must expect to feel the reaction.

Having gained the benefits of the reaction from past records, whether it be voluntary through a check-up on our own work, or through reaction from our graduates' endeavors, it is our plain duty to profit by them through improvement in our work.

Teaching, like all things, must either improve or deteriorate. We cannot stand still. Each day is the time to make notes upon the poor points of a course or lesson. The improvement must be gradual—it should not be left until the following year, depending upon the memory for past accomplishments.

The present should be concerned primarily with testing the results of our research and planning, based upon the experiences of the past.

If we look enough into our past and make the best of our present, we need have but little worry of the future.

NEEDED AN ENDOWMENT

After a struggle of fifty years, the National Education Association about 1920, rounded out an organization more or less expressive of the entire teaching body of the United States and suggesting good management and efficiency of leadership. Our state teachers' associations have for the most part come through similar experiences of many years of indifferent existence, followed by recent reorganization leading to more nearly one hundred per cent enrollments, more largely attended conventions, and definite service to the teachers. Our associations of specialists and directors have not kept pace with the progress of the National Education Association or the better state associations because of a very simple but very difficult problem.

The National Education Association and the various state teachers' associations have developed large incomes from large memberships and have supplemented these by returns from their official organs. It has been relatively easy to keep up these large incomes because of the interest which teachers have had in legislative programs and in certain other activities that have offered a personal return to the individual members.

Associations of specialists in vocational work, industrial arts, and drawing have not been able to secure large memberships and have not found opportunities for effective promotional work in their fields. The difficulty seems to have been that the activities of the Western and Eastern Arts Associations have been entirely among people who are already convinced and the sum total of many years of promotional work of the two associations hardly has been more effective than the two national exhibits prepared by Superintendents McAndrew and Condon for the Department of Superintendence. These shows squarely put before a great number of city superintendents the possibilities and the opportunities of art instruction and "sold" the work to the responsible heads of city and state school systems.

It would seem that the Western Arts Association and the Eastern Arts Association should take some steps for promoting membership and for bringing the mission of the fine arts and the industrial arts to a greater number of teachers in these two fields of work, as well as to school superintendents and other school executives. It would seem that if the financial problem of these associations is solved, the membership problem and the problem of more widely spreading the work will take care of themselves.

During its pioneer days the financial problems of the National Association for the Promotion of Industrial Education were ably solved by the generous support of industry and of a few philanthropic men. No endowments were sought; simple appeal annually was made to a number of interested businessmen and adequate funds flowed into the treasury of the association. Perhaps no other school organization has been so fortunate as to find that its program has a direct business appeal to a considerable number of industrial and business leaders. If it saw fit, the American Vocational Association might easily follow in the footsteps of its predecessor and secure funds from industry. The Eastern and Western Arts Associations are in a little different situation and must depend upon schoolmen primarily for their support.

It would appear that definite membership classifications might be of some assistance in putting the Eastern and Western Arts Associations on a higher professional level. It would seem, too, that some form of endowment affording the associations fairly liberal annual incomes would help solve the problem. Life memberships and institutional memberships, paid for in advance in amounts ranging from $100 to $500, would form the nucleus for worth-while endowments. Memorial funds might very well be raised in the names of the great pioneers in art education and in manual-arts and vocational education. The lives of such men and women as Calvin Woodward, Bonnie Snow, James Parton Haney, and Hugo Froehlich should live on in these associations in the shape of endowment funds, the proceeds from which are used for special association efforts. Such funds, if properly used, might well be devoted to research that would make the organizations effective and indirectly promote increased memberships.

HIGHER VOCATIONAL EDUCATION IN RUSSIA

A "professional post-graduate course for shepherds" is reported to have been established in Moscow, where the authorities are said to be highly displeased with the old way in which shepherds were allowed to train themselves. Henceforward they must take a degree and prove themselves proficient in botany, biology, veterinary science, and any other subject which can minister to the comfort of mutton in the rough. Some of the older shepherds would evidently have been very badly ploughed. That stout fellow Gabriel Oak would doubtless have accommodated himself to the new regime and finally passed the examiners, but the case of the amiable but almost amateur Bo-Peep seems quite hopeless. We shall have to rewrite the nursery rhyme on some such lines as these:

Little Bo-Peep has lost her sheep,
She's thrown in her hand and resigned them—
For without a degree it is plain as can be
That she's not the right person to mind them.

—*Manchester Guardian.*

THE HIGH BOARD FENCE

Laurence Parker, Kansas State Teachers' College, Pittsburg, Kansas

Twice a day our street car used to pass a manufacturing plant hidden behind a high board fence. We neither knew nor cared what went on behind the fence. Once we happened to be passing when workers were pouring out through the gate, and we thanked our lucky stars that we did not have to work in there behind the high board fence.

One day workmen tore down the high board fence and put up in its place a wire fence. We were surprised to see that the buildings within the enclosure were vine-covered, with many clean windows. There were green lawns separating the buildings and we found that they were making a most interesting product that we were curious to see made. All this we learned when the high board fence was torn down.

A superintendent of schools a few years ago started the plan of running regular school sessions for one evening each year in order that parents and other residents of the community could see what was going on "inside the high fence" without losing time from their work. He found that the parents were much interested and walked from room to room watching closely the way a modern school is operated and comparing it all, perhaps, with the way things were done in the old days when they attended.

The manual-training teacher of that town was very enthusiastic the day after the first "evening" session. He said, "Some of those parents had not the least idea of the class of work we are actually doing in the shop. The foreman of the planing mill was surprised to find that we had such good woodworking equipment and wished that he had known about it early in the fall and could have come into an evening class in furniture making. Mr. Brown, that tall, thin man who lives in the second block from the school, was pleased to find that some of the boys are doing such good work and said that he should mention the fact to his own boy who brought home some poorly finished work the other day. I surmise that his boy had put all of the blame for his poor work on me. Oh, there were a lot of comments by visitors, but they all showed surprise that we have so much and such good equipment, and that the boys are doing so well." Mr. Manual-Training man was delighted with the results of this one example of tearing down the high board fence.

There are other effective ways in which the manual-training man can do the trick without waiting for the superintendent to plan an evening session of the schools. We are suggesting these ways to the new man who is coming into the community, for many of the readers of the magazine will be doing so this fall.

Join the local chamber of commerce or the commercial club, if there is one in the community. Attend the meetings and, if they give you a chance, give them a talk about your work. If they have an educational committee, invite the members to visit your work as often as you have interesting work to show them. Perhaps, before the year is over, you can invite the whole club to visit the school.

See that it is a good talk with a display of work. Hold the meeting in the shop if you can.

Get acquainted with your newspaper editor. Get *well* acquainted with him. Drop in on him on Saturdays and bring along little items about what the boys are making. Invite him to stop in and see the new jointer that has just been delivered, or the new piece of furniture that you are making for yourself. But don't bore him with your troubles and make your visits short—he is a busy man.

If you belong to any organization or society of any kind attend its meetings. Get well acquainted and when the man who sits next to you asks what your business is tell him and invite him to come over and see "that order of 36 cafeteria tables" you are turning out for the new section of the high school.

There is a selfish advantage to all this procedure, which is worthy of consideration. You will by such methods as these, if you are worthy of the honor, *dig yourself in* as a member of the community. You will cease to be a *suitcase* teacher, changing towns every year or so and really belong with all the pleasant associations that come from being one of the family.

After all you are just as much *in business* as the man who runs a bank and loans money, the man who keeps a grocery, and the man who cans tomatoes down near the station. You have your work and yourself to sell to the new community. Everyone whom you come in contact with, who buys a nickel's worth of anything inside the city limits, helps to pay your salary. It will pay you to use one or more of the ways outlined or others which occur to you, to tear down the high board fence and let "the customers" who are your paymasters, know what fine work you and your boys are doing in your shop.

INDUSTRIAL ARTS AS A SOCIAL STUDY

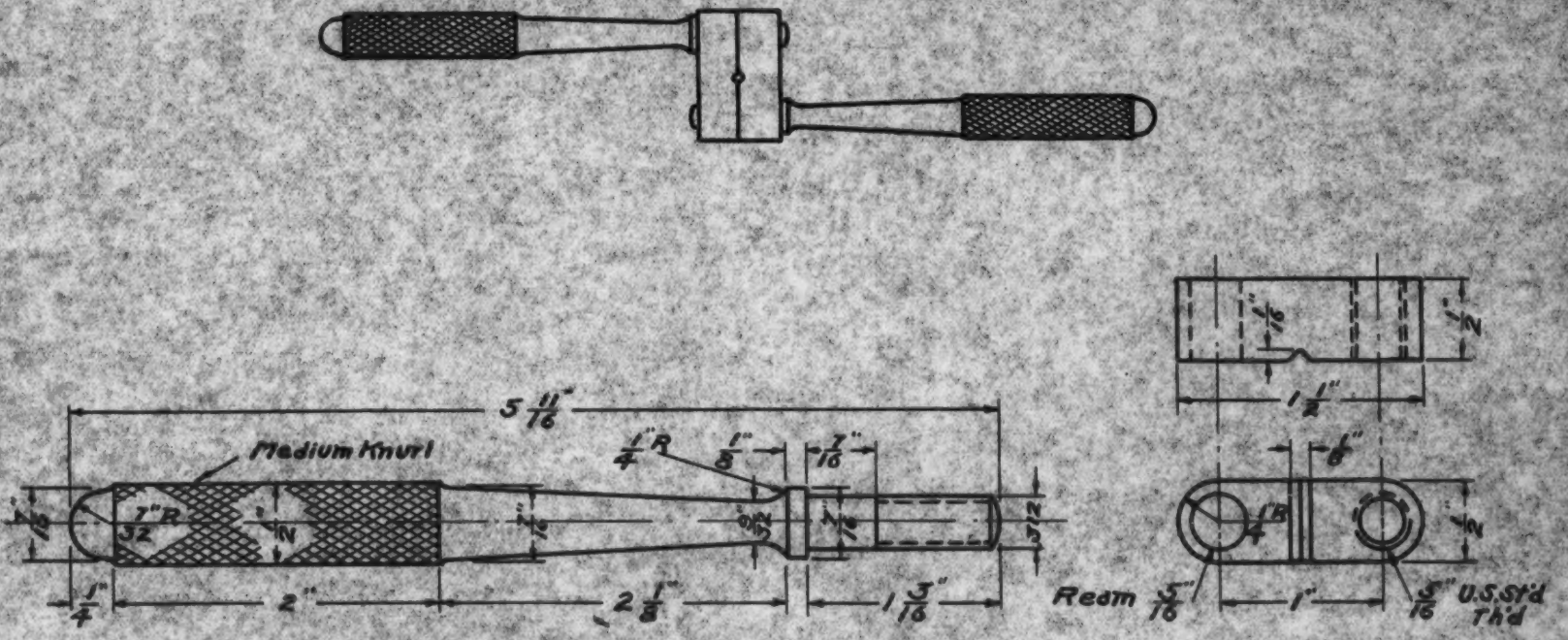
Mr. Frederick G. Bonser, of Teachers College, Columbia University, in the June 11 issue of *School and Society*, discusses the industrial arts as a social study. Mr. Bonser holds that there is adequate justification for maintaining that the industrial arts contribute the point of vital contact between the experiences of daily life and the history-geography-civics content of the social studies. The reason is that the content of the industrial arts is the experience of daily life a hundredfold more than is the content of history or geography or civics. The learner, Mr. Bonser says, is daily a consumer or user of the products of industry and he is in the midst of the activities by which many of these are directly produced.

First of all, says Mr. Bonser, for true learning, there must come those experiences and investigations which relate to immediate problems of supply, selection, cost, use, and conservation of materials and products found in one's home and community. From this study as a foundation of experiences emerge most of the questions for which we may have to go to geography, history, or civics for answers. Here is where industrial arts has its place in finding first the health, economic, appreciative, and social facts and problems of individual, home, and community life relative to the use and production of material supplies.

The point of view presented may seem meaningless to one thinking of industrial arts as old-time manual training or handwork. But industrial arts is today, in the better schools, a study of the industries for the values that such studies have in the pursuit and interpretation of daily life. Work with tools and materials is for the sake of clarifying ideas and cultivating attitudes and appreciations of values relative to the use, distribution, and production of industrial supplies.

One of the industrial-arts units of work appropriately receiving attention in every grade of the elementary schools is that dealing with the questions of how we are clothed. Very early in the study, the great variety of materials which are used in clothing will become apparent, such as cotton, silk, wool, and leather. What forms of adulteration are found in clothing materials and products? What knowledge of trade names and trade practices must one know to buy clothing with intelligence and safety? What changes in the home production of garments have taken place within the last one hundred years in this country? In what parts of the world are people affected by our decision to use linoleum rather than rugs or carpets for certain floors? What difference does it make whether people are dressed in good taste? These are but scores of questions which may arise or be stimulated in connection with a study of clothing.

For foods, shelter, and furnishings, for utensils, books, and periodicals, for tools and machines, and for industrial materials and processes there are problems no less numerous and significant in social values. Instead of book materials assigned to be learned or manipulated tasks to be performed, industrial

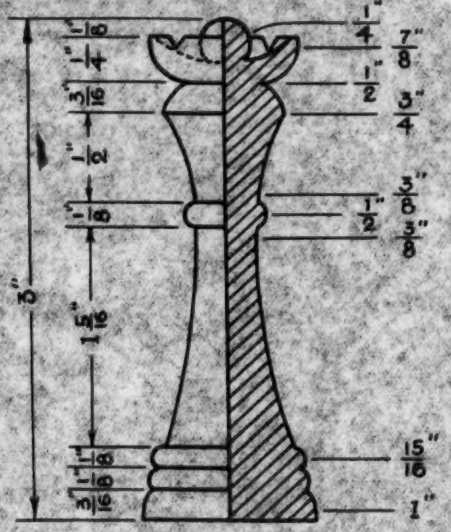


TAP WRENCH

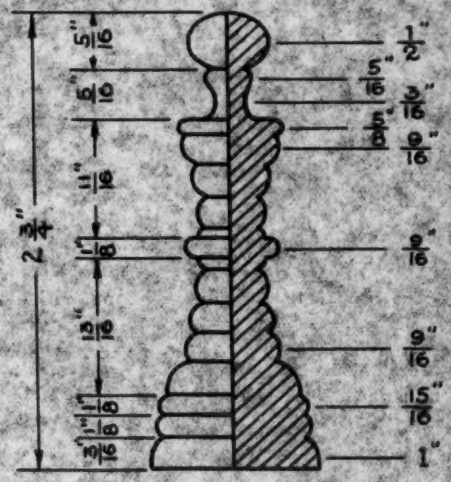
Designed by Arthur F. Ahr, Woodlawn, Pa.

For Details see Page 303, Industrial-Arts Magazine, August, 1927.

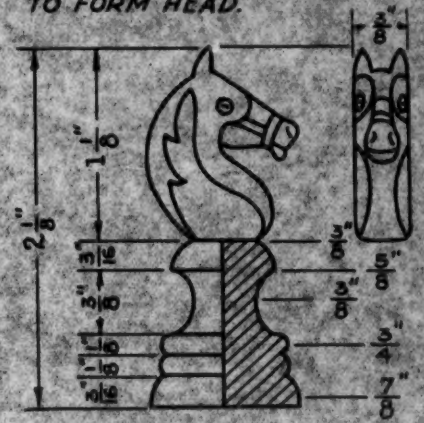
To be Reprinted for School Shop Use Only.
© 1927, The Bruce Publishing Co.



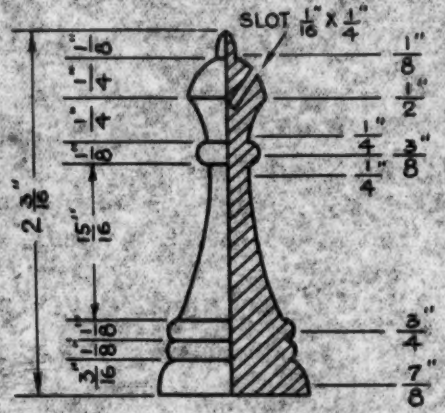
KING { 1 WHITE
1 BLACK



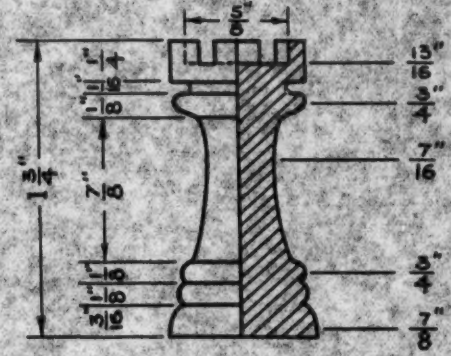
QUEEN { 1 WHITE
1 BLACK



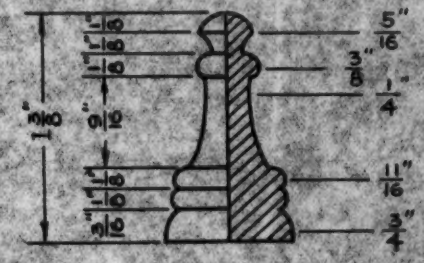
KNIGHT { 2 WHITE
2 BLACK



BISHOP { 2 WHITE
2 BLACK



CASTLE { 2 WHITE
2 BLACK



PAWN { 8 WHITE
8 BLACK

CHESS MEN

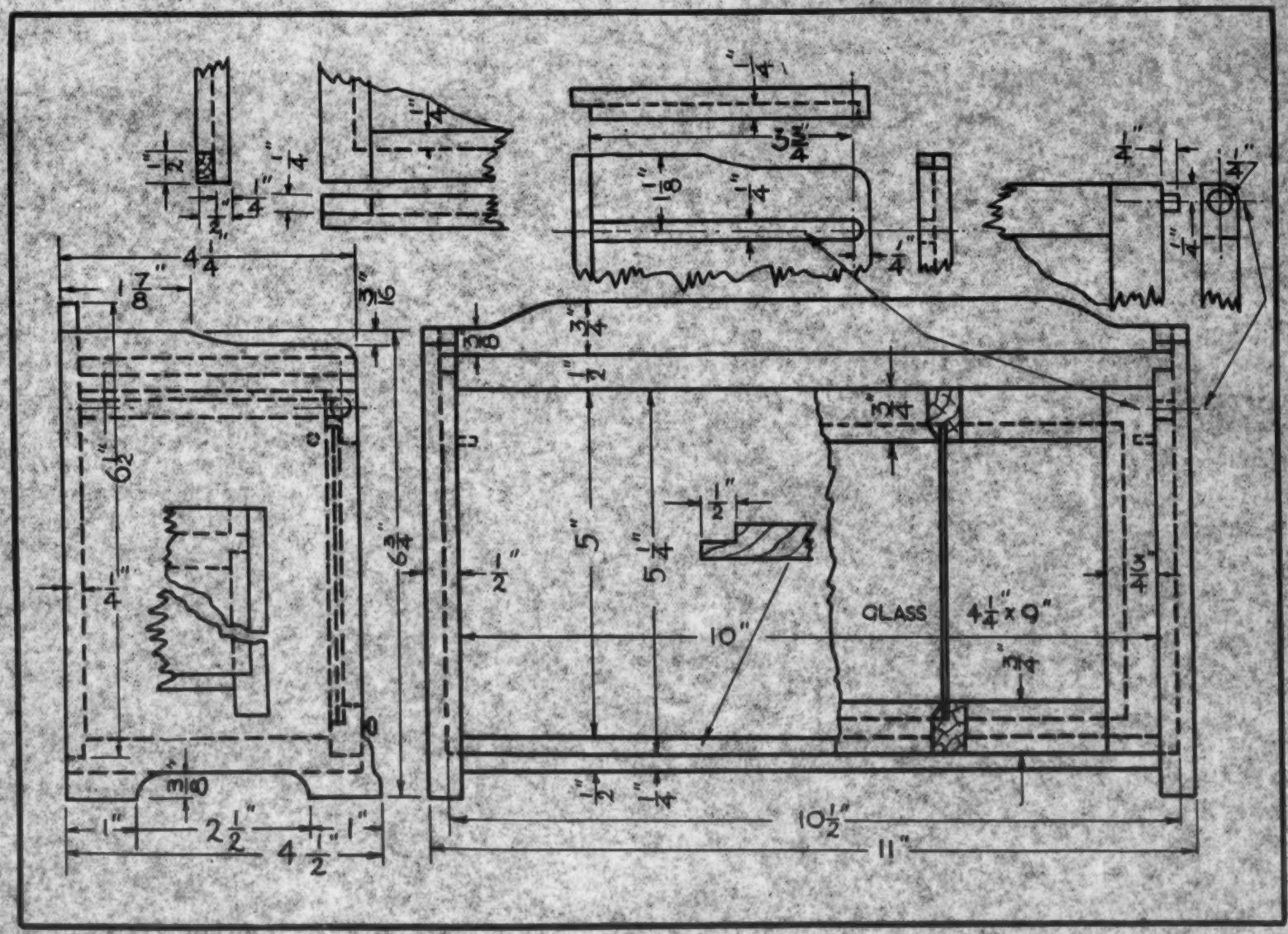
Designed by Everett M. Stanley, Waterbury, Conn.

For Details see Page 305, Industrial-Arts Magazine, August, 1927.

THE INDUSTRIAL-ARTS MAGAZINE,
AUGUST, 1927.

© 1927, The Bruce Publishing Co.

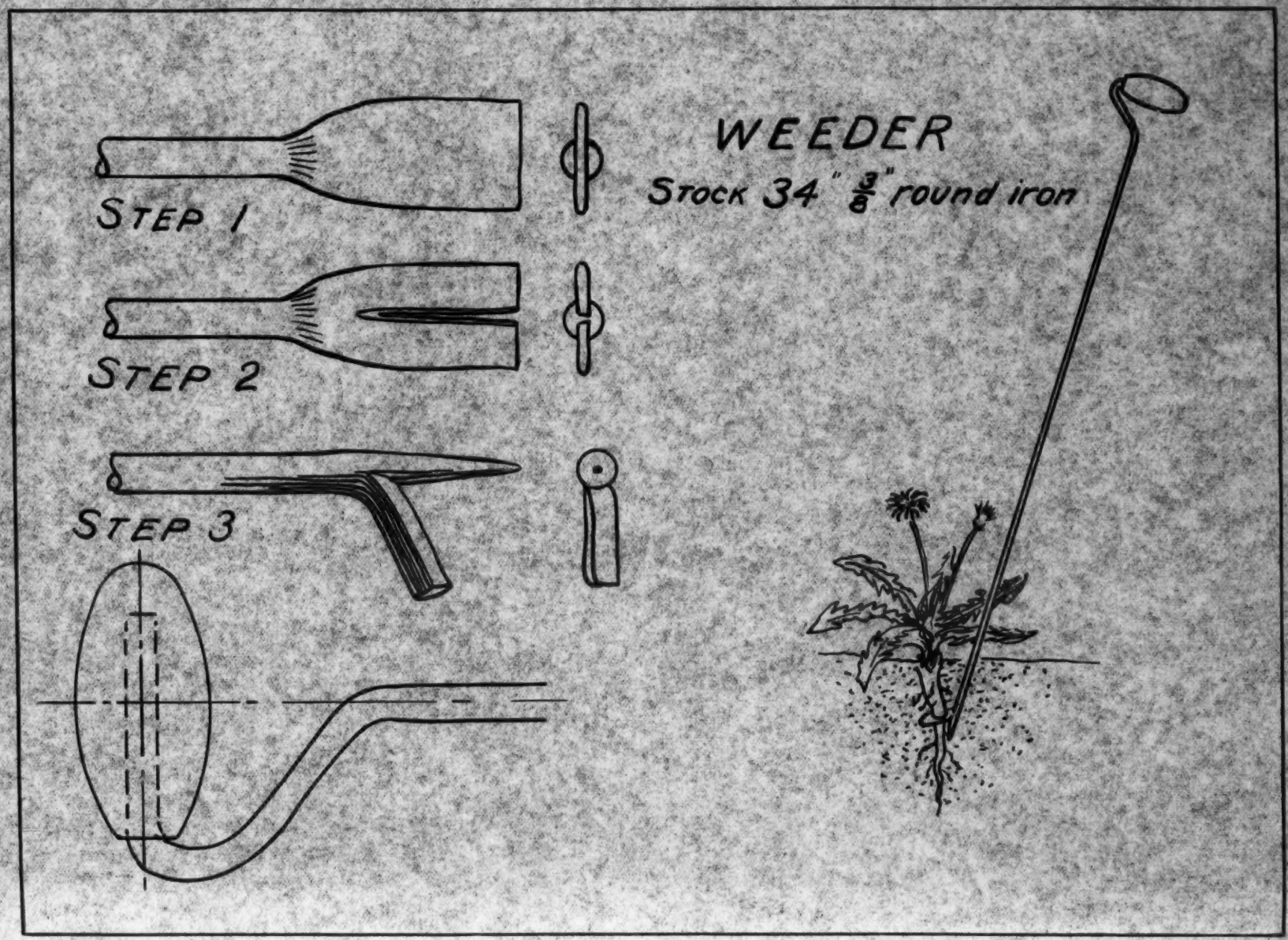
© 1927, The Bruce Publishing Co.



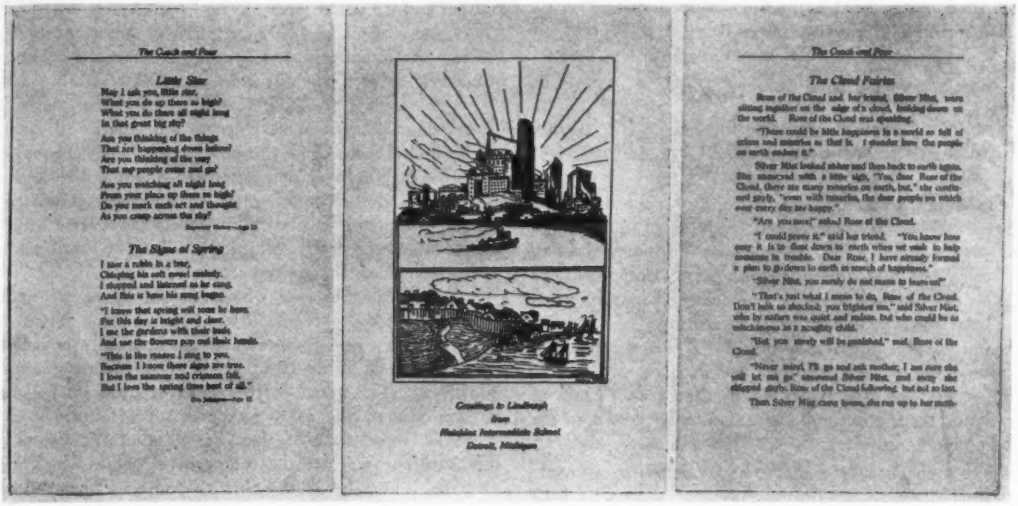
Designed by Edward J. Tesch, Sheboygan, Wis.

For Details see Page 305, Industrial-Arts Magazine, August, 1927.

To be blueprinted for School Shop Use Only.
© 1927, The Bruce Publishing Co.



Designed by G. G. Greene, Lane Technical High School, Chicago, Ill.



TYPICAL PAGES OF "THE COACH AND FOUR."
The body of the book is printed on deckel edge India tint, laid book paper of good quality. The pages shown are typical of the careful balance of type and margins.

arts becomes educative experiences, calling for a rich and varied content to be derived from observation, construction, experiment, and investigation.

Mr. Bonser urges that the time has come to include in the school course the problems which people must face outside of school and the kinds of activities in which they do and must engage in daily life. Apart from its values relative to health, economy, and art, in themselves all social as well as individual, industrial arts includes the opportunities for direct contact with social problems of the kind which affect the cooperative activities and relationships of life as it is lived. A few school systems have become aware of the values of industrial arts as contrasted with old-time manual training, busy work, and handwork, and have appreciated the social values as of worth in developing social habits, attitudes, and an understanding of the basic needs and values of individual, community, and national cooperation. In industrial arts, as now organized, with its rich content as well as cooperative opportunities for constructive, investigation and art forms of appreciation, lies a means of education of the first order. The social studies may well be expanded to include industrial arts as representative of the basic social activities.

PRACTICAL WORK IN THE PRINTSHOP

A. D. Anderson, Instructor in Printing; Conscello Cole, Instructor in English, Hutchins Intermediate School, Detroit, Michigan

A project was undertaken at Hutchins Intermediate School a year ago in which the printshop and the English department wished to test the extent to which the two departments could correlate on a given activity. The result was a book of 48 pages, published under the title of "The Poets' Corner." The size of the book was 5 by 7 in., and the poems which it contained were written and proof read by pupils in the English classes, many of whom were also members of the printing classes.

This proved so successful and was so popular with the pupils, that this year a book of 40 pages, 6 by 9 in., was put out under the title "The Coach and Four."

One of the lessons in the 8B printing course is to set up a poem; so after the general class instruction every boy was given a complete poem to set up, which he proof-read and corrected himself. It was then checked over by the English department for possible errors which had escaped the pupil's notice, and returned to the boy in charge. The boys whose poems were selected were required to lock up their own forms. Each boy was allowed to print some of his work on the press.

The folding and assembling was done by girls in the English department, after which the boys stapled the book.

The pictures were drawn by members of the Young Authors' and Artists' Club, and we were fortunate enough to secure the zinc etchings free, through one of the boys in the printing class.

This was found to be a very good practical problem in the shop for it included handsetting, imposing, make-ready, pressfeeding, and binding. On the side of the English department it taught accuracy in capitalization, punctuation, and spelling, in addition to the proper terms and marks used in the correction of proof.

THE COVER OF THE BOOK IS DOUBLE WEIGHT, ANTIQUE FINISH STOCK, NEUTRAL BROWN IN COLOR AND PRINTED IN DARK BROWN. IT MEASURES 6¼ BY 9¼ INCHES.

CUTLERY FOR THE SCHOOL FORGE SHOP

Jay F. Knowlton, Supervisor Boys' Industrial Work, Hibbing, Minnesota

(Fourth Article)

Successful Tempering Method

There are many methods of tempering knives, but the one which the writer has found most successful for students is as follows:

The fire should be a deep, arched one of coke, having a long, dull-red bed. The blade is held edge down in the arch, not resting on the coke. The blade should be removed when it is a dull, even red, and should be plunged horizontally, edge down, into oil to harden. Regular tempering oil may be used, but plain linseed oil makes a good substitute. Next polish on the medium buffer until it is bright. Then the blade is drawn over a red-hot piece of iron, one inch by two inches. The handle should be drawn soft up to the blade. Half of the blade, including the cutting edge, should be drawn to the first shades of blue, and the back to a darker blue.

This is not so definite a method of tempering as could be given with the use of an electric furnace, but with a little practice, good results can be obtained. It is taken for granted that comparatively few shops have electric furnaces and up-to-date equipment.

Next the blade is buffed to a fine finish, the handle is riveted in place, trimmed to shape, and polished. If care is used in buffing, the knife will have a keen edge without the use of a hone.

Buffing and Polishing

A knowledge of buffing and polishing is necessary for the best results in making butcher knives. Knives with narrow blades, such as hunting knives, may be finished by hand with emery cloth; but not so with other knives. It does not require a great expenditure to have a buffing machine in the shop. A satisfactory one can be made in the shop, or the grinder or lathe can be converted into a buffing machine.

The buffing equipment need not exceed a wheel or two, some glue, a few pounds of emery, and some equipment that revolves the wheel at a fair rate of speed. Of course, it is fine to have a dozen or two wheels and a fine electrically driven buffing machine, but such is not within the reach of most school systems. The writer's equipment has comprised an old surface grinder, a few wheels, and three grades of emery, the whole bought at a cost not exceeding $20.

The purpose of buffing is to remove the rough surface by grinding with a coarse emery. The marks of cutting are removed by a finer emery, until the last marks are invisible.

The buffing is accomplished by grinding the steel on the flat or curved surface of a wheel, to which emery has been applied with glue. The first wheel has coarse emery, the second finer, the third still finer, and so on until the desired number of wheels have been set up.

For knife work, the wheels should be of the hard, solid type with straight faces. They may be purchased from a dealer or from one of the several companies who make them. The wheels should be 10 in. or 12 in. in diameter and have a 2-in. face. The speed of the wheel depends on the diameter, but for schoolwork 2,000 revolutions per minute is sufficient.

The wheels can be bought in several different grades. First and cheapest are the composition wheels which are made of paper fiber and cloth, glued together. These wheels give good results in schoolwork. A better grade of composition wheels can be obtained.

Then come the solid wood wheels covered with 2 leather strips. These wheels are quite solid and lack the "give" noticeable in the first wheels. A wood wheel can be made, if necessary, by turning up a wood block and gluing a piece of a leather belt on its face. The leather should not only be glued but also drilled and fastened with wooden pegs. Before using the wheel, it should be turned true both as to surface and balance.

The next, and perhaps the best wheel, is what is known as the "bull-neck wheel." It is composed of pieces of heavy leather glued together, and is expensive. Other leather wheels are made from sheep skin, but the bull-neck wheel is most commonly used.

Other materials needed are emery and glue. Emery comes in different grades and makes. Pure Turkish emery is as good as any. The grades of emery most generally used in the school shop are Nos. 40, 60, 90, 100, and FF. The num-

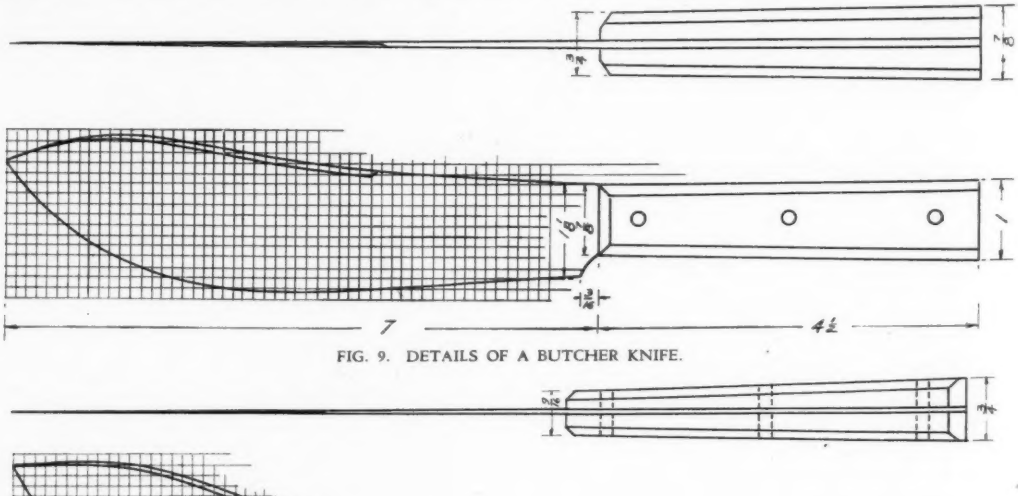


FIG. 9. DETAILS OF A BUTCHER KNIFE.

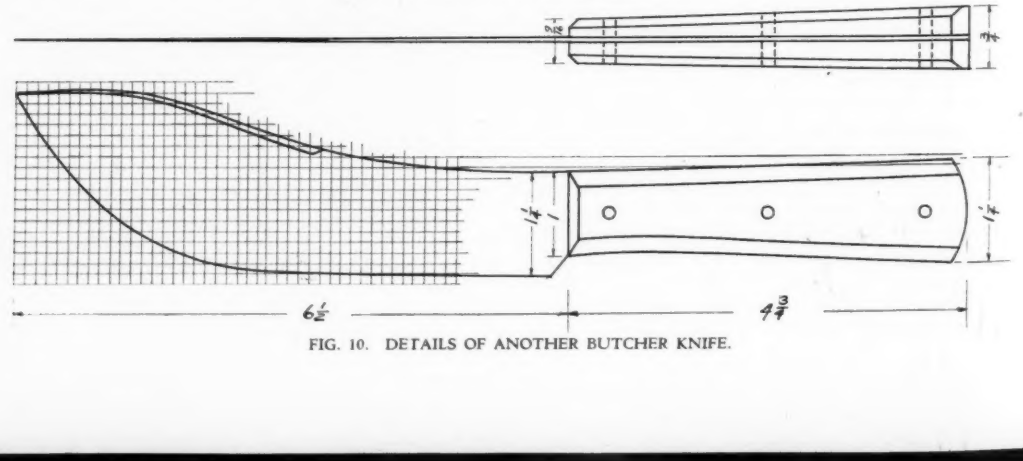


FIG. 10. DETAILS OF ANOTHER BUTCHER KNIFE.

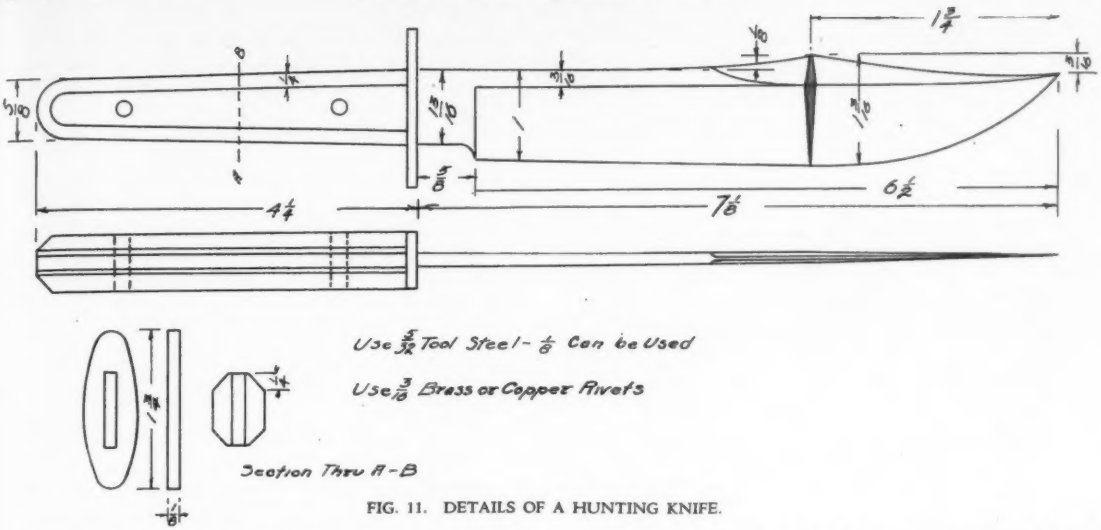


FIG. 11. DETAILS OF A HUNTING KNIFE.

bers represent the size of the grit; No. 40 is the coarsest and FF, which is like flour, is the finest. The emery can be bought in 5- or 10-pound packages and should be placed in curved trays in which the wheels can be rolled. The glue should be a good grade of hot glue; the grade called "XXXX" gives satisfaction.

The method of "setting up" the wheels, which means the method of applying the emery, is as follows: The wheels should each have two or three coats of thin, hot glue sizing. Having warmed the wheel so that the glue will not chill, give it a coat of glue, after which roll it in the emery and hang it up to dry. Do not pound the wheel in the emery, but rather roll it. At least two such coats of emery should be given before the wheel is used. The consistency of the glue should be about the same as that used in woodwork. It is important to keep the wheel properly balanced by obtaining an even face of emery. Using glue too thick, wheels that are cold, or an uneven pressure of the wheel in the emery, are a few of the dangers to be avoided.

One wheel should be set up with No. 40 emery, another with No. 90, another with No. 120, and the last with FF. It is possible to use only three wheels, such as a 60, 120, and FF. It is also possible to use only two wheels, as 60 and 120. The last combination will give fair results. Better results can be obtained by using a grease on the last wheel of each combination. To avoid a large equipment cost, one can use tripoli for grease.

Knives should properly be buffed across the blade, but due to the danger in schoolwork, it is better to buff lengthwise. It is best to change the direction of buffing when the grades of wheels are changed, so as to know when all marks made by the wheel are removed, but this cannot be done in schoolwork.

After the blade has been buffed with the last wheel on which tripoli has been placed, it will be noticed that the steel has a smooth, fine surface with a satin appearance, but that it lacks the color peculiar to polished steel surfaces. Where it is desired to obtain color and luster, this may be done on the polishing wheels. So far the work is termed buffing, but the color work is called polishing.

The polishing is done on a soft wheel made of sections of canvas. The wheels are held in shape by centrifugal force, and tripoli, crocas, or rough, is applied to the surface of the wheels while in motion. Tripoli, crocas, and rough are compositions in stick form and may be purchased from the manufacturers of buffing and polishing equipment. The blade is applied to the wheel until the desired color is obtained, when it is said to be polished.

When new emery is placed on worn buffing wheels, the old emery should be removed by washing. The operation of preparing the wheels is the same as for new wheels.

Buffing work in the school shop has its dangers, but if boys are instructed to hold their work a little below the center of the wheel, little trouble will be experienced. The polishing wheels made from soft canvas are more dangerous than the hard wheels. Boys should be cautioned not to place too much pressure on these wheels, for at low speed they will buckle and have a tendency to catch the work.

(To be continued.)

A NEW USE FOR OLD PICTURE FRAMES

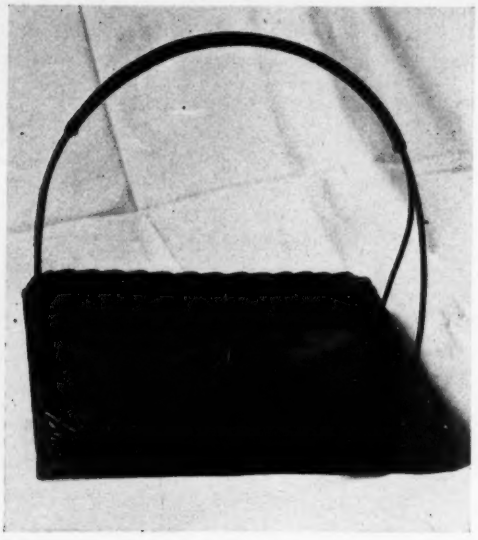
Arthur West, Seguin School, Cincinnati, Ohio

Evolution applies to things other than vegetable and animal life. Many an old picture frame that would ordinarily find its way to the ash-heap, can be reclaimed and made into a beautiful and very inexpensive serving tray. The materials needed are an old wooden frame with glass, a pretty piece of cretonne or wallpaper secured from a sample book, a few cents' worth of reed, and a little paint, preferably lacquer or enamel. The cost is negligible, but the finished article, if well made, should command a price of at least several dollars. Possessed of a heart and mind in perfect tune with artistic standards, I, nevertheless, see a need for emphasizing money values in connection with schoolroom products. I have spent considerable time in working out projects, using waste materials, and I consider the serving tray described here an excellent example.

The picture frame should have a fairly level top surface, but not necessarily so. Remove the glass, and with a drill, bore holes in the frame for No. 3 reed spokes. First bore a hole in each corner of the frame. The weaving and baseboard will hold together. Next bore holes between the corners, and about ¾" apart. It is best to have an uneven number of spokes, by placing an extra hole on one side. This can be done by placing a certain number of spokes closer together, but trying to maintain a proper balance. I suggest an uneven number of spokes so that the simple "under and over" weave can be used, in case the child and teacher are unfamiliar with the triple weave. The triple weave gives a better and more compact appearance, and the directions can be readily followed in any book on basketry.

Next bore two larger holes on each end of the tray for the handles. These holes should be closer to the inner edge of the frame than the other holes, yet not so close that they will interfere with the glass. They should be about 4" apart, and a No. 5 or No. 6 reed should fit snugly in the holes.

With all the holes bored, you are now ready to place the glass and decoration. A water-tight surface is desirable, and here is my solution to a problem of long standing. Take some



SERVING TRAY MADE WITH AN OLD PICTURE FRAME.

gesso that has been thinned with water, and brush same all around the inner edge of frame, the part against which the glass rests. Put the gesso on thick enough, for when placing the glass, you apply some pressure until gesso dries. Any excess will ooze out in front of glass, and can be readily removed later. The glass once placed, put your wallpaper (cretonne or painting, if you choose), in place, and enough cardboard in back of this to bring the surface level with back of frame. Make the sides secure, and nail a thin board over the back, the latter making a neat covering for the bottom.

Now cut spokes of No. 3 reed about six inches long (depending in part on thickness of frame), dip one end in glue and insert in holes. Start to weave the sides immediately, for the wet reed keeps the glue soft until finished. Weave four rows of triple weave, being sure to keep sides perfectly vertical. Many a good tray has been spoiled by weaving too tightly and drawing the side inward. Finish with a rope border, which is made by bending each spoke and putting it in back of the one ahead of it and out, all the way around, then in front of the next spoke and in, all the way around. Clip the ends, and then you are ready for the handle.

This is made by using two pieces of heavy reed No. 5 or No. 6 and of equal length. Glue and insert in the large holes (pushing through border, if possible); nail a wire brad on the slant through reed and into wood of the frame. The glue and nails are sufficient for ordinary sized trays. With string, tie the two reeds together at the same distance from base on each side, then with a long No. 1 or No. 2 weaver, proceed to wrap the handle between the points tied. Be sure the weaver is well soaked to prevent cracking. Wrap tightly, and finish by pushing weaver through the last few rows of wrapping.

Paint the tray in bright, cheerful colors, using a combination that harmonizes with the underglass decoration. The tray illustrated was painted a bright green, with gold touches on the border and handle. The baseboard was edged in black. Be sure to paint down to the very surface of the glass, so as to waterproof the gesso filler. An old safety razor blade will readily remove dry paint from the glass, and, of course, two coats of paint will be needed.

This is a project that meets with hearty response from both boys and girls, and teachers of basketry welcome it. It is something new, interesting, and economical, and it suggests other uses for the old, worn-out picture frame.

A TRYOUT COURSE IN CABINETMAKING

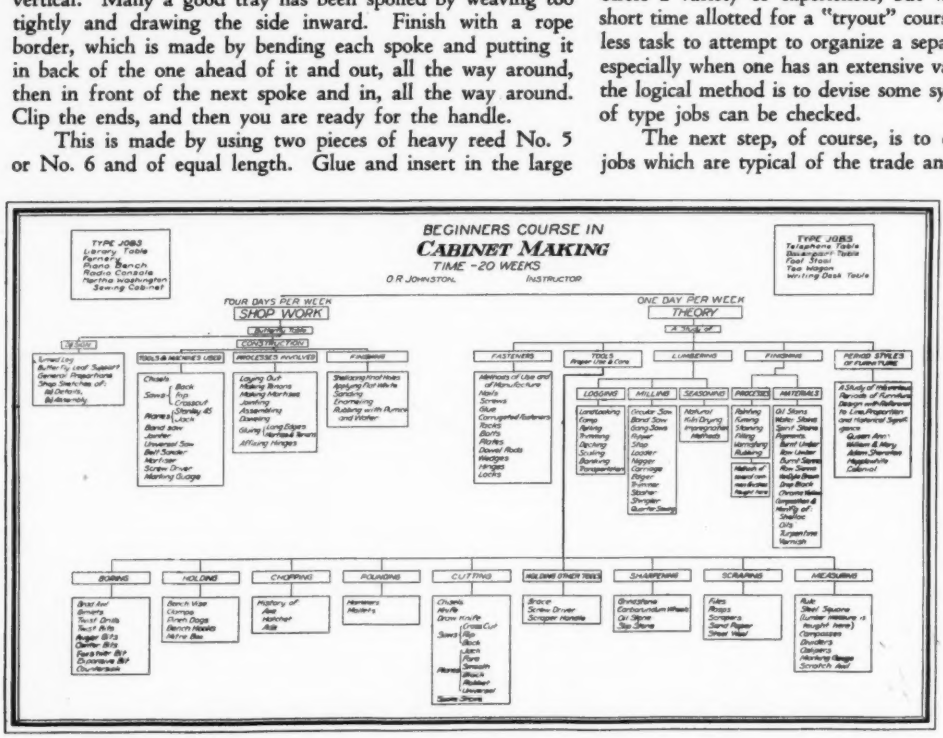
O. R. Johnston, Roosevelt High School, Los Angeles, Calif.

MANY HIGH SCHOOLS are organizing short-unit courses in shopwork for the purpose of giving a variety of occupational experiences to the boys. These occupational experiences may serve as a basis for future vocational choice, or they may contribute to general education. Therefore, in organizing short-unit courses, we must constantly keep in mind that the content of the course must provide both skill and industrial knowledge.

Short-unit courses must be thoroughly analyzed, else very little of value can be given. The tendency often is to devote too much time to only *skill,* or too much time to only industrial *knowledge.* Then the question naturally arises as to how the work can be organized so that the necessary skill and knowledge can be incorporated in the program.

Of course, we who teach the work realize that this trade offers a variety of experiences, but we have only a definite, short time allotted for a "tryout" course. It would be an endless task to attempt to organize a separate chart for each job, especially when one has an extensive variety of jobs. It seems the logical method is to devise some system whereby a *number* of type jobs can be checked.

The next step, of course, is to decide on a number of jobs which are typical of the trade and which can be done in the shop.



However, the effectiveness of this chart depends upon the last step which is to take one type-job and thoroughly analyze the content of the work so that all the skill and knowledge r e q u i r e d are listed. All of the teaching content is then placed under two headings: shopwork and theory. The chart was then made, thus giving a systematic form which serves as a check for both the teacher and the pupil.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

TAP WRENCH

Arthur F. Ahr, Harding High School, Woodlawn, Pa.

See Supplement, Tracing No. 65.

The tap wrench is one that can easily be made from the stock found in the average machine or industrial-arts shop and is an appropriate project for either shop. It is a useful tool and will find a welcome place in every boy's tool box.

The wrench is made from machine steel and is case-hardened to stand ordinary use. A heavy case on the jaws and a light case on the handles gives the best results. The handles are polished, and the jaws may be mottled or polished to suit the individual.

A SMALL BOOKCASE

Edward J. Tesch, Sheboygan, Wis.

See Supplement, Tracing No. 67.

The bookcase in the accompanying drawing is made of odds and ends of lumber, and can be made at very little cost. It is a good shop problem as it is practical.

The case may be adapted to any small set of Shakespeare or other miniature books by alterations in the sizes. The sizes given here were adapted to a cherished set of books in the writer's library.

Bill of Material

Finished Stock

Back—1 pc. ¼x6½x10½.
Top—1 pc. ½x4x10½.
Bottom—1 pc. ½x4¼x10½, quartered oak, walnut, or mahogany.
Side—2 pcs. ½x4½x6¾.
Frame—2 pcs. ½x¾x10.
Frame—2 pcs. ½x¾x5¼.
Glass—1 pc. 4¼x9.

The back requires the least work, which is merely cutting down the two top corners, as shown. The top has a ¼-in. rabbet cut on the lower side of both ends. The bottom piece has a ¼-in. rabbet cut on the three edges, and a ¼ by ½-in. rabbet on the front edge. The sides require the most work and must be done accurately. A ¼-in. dado is cut ⅜ in. from the bottom inside edges, and across the side pieces. Next, cut in another ¼-in. dado ⅜ in. from the top inside edge and across the top inside edge and across the piece. Then cut in still another dado ¼ in. wide and deep, 1 in. from the top, but not through to the front. This is for the door pin to slide in and should be open so that the door when finished, can be easily inserted after the case is made, but before the back is put on. The last work on the sides is to cut out the round part below, and to cut and shape the top edge. The toe on the front of the side piece can be cut and put on separately.

The doorframe is merely a ½x¾-in. molding with a ¼-in. rabbet cut into it. If machinery is available for some of this work, it is safer to work with larger pieces, doing as many operations as possible before the pieces are cut to size. The doorframe can be either half-lap or miter jointed. The side of the doorframe used toward the top should be rounded on the outside edge, to allow an easy movement when it is pushed up and back in the groove. The pins upon which the door swings and slides can be made of ¼-in. doweling, sanded down to make them slide easily, and glued into the frame.

When the sides, top, and bottom are ready and well sanded they may be glued up. It is well to have the door done and ready to insert when the case is glued up. The back will keep the case square, and may be glued in or nailed with brads. The glass is held with a quarter-round tacked against it. A pin or brad should be put into the side of the case to support the door when opened.

The bookcase will prove a decorative piece for any living room, library, or den, if properly made and finished.

A CHESS SET

Everett M. Stanley, Waterbury, Conn.

See Supplement, Tracing No. 66.

As a game, chess has no equal for the development of real mental power. It causes one to plan ahead, to see and avoid possible pitfalls, and to take advantage of every opportunity. The common mistakes of chess are very similar to the common mistakes in life. As you play the game of chess, so you are likely to live your life. The character of the one is displayed in the character of the other. The greatest value of the game is that it causes one to at least try to plan and to think a situation clear through; and when one thinks things clear through, he will not go far wrong. It is a great game.

The set consists of two kings, two queens, four bishops, four castles, four knights, and sixteen pawns, half of which are black or at least dark in color and half white or at least light. For the light piece, use maple or birch. A piece of doty maple, i. e., maple which has been on the ground until the wood shows colored streaks, is very attractive. For the dark pieces, use mahogany or dark black walnut. I prefer to glue up this stock from red cedar and dark black walnut, as a set made of these woods differs from anything that can be purchased and is very beautiful as well.

In building the set, notice the bases of all the pieces are very much the same. They are all turned on a screw chuck, and are all well undercut when skew-cutting them off the stock.

Start with the pawns, using stock a little larger than the stock required and about an inch longer than the finished product. Chuck the stock and cut down smoothly to the diameters shown. Use no sandpaper, for if your tools are sharp and have been rightly held, you have a finer surface than it is possible to obtain by using sandpaper. Carefully apply white shellac, polish, and cut off.

After the sixteen pawns have been made, you are ready for the four bishops. These should cause no trouble for they are similar to the pawns. After a bishop is turned and before it is cut from the screw chuck, cut the slot either with the backsaw, the chuck being held firmly in the bench vise, or by holding the bishop, chuck and all, against the crosscut circular saw, the same being elevated as high above the saw table as it will go. Now be sure to work the white shellac into the slot and polish well when the bishop is well undercut.

Now build the two kings. Not a difficult problem, since you have mastered the building of the bishops and pawns.

Next in order are the four castles. After the turning is completed, cut the four slots in the top rim in exactly the same manner as you cut the slot in the bishop. Polish well, and cut off.

Now for the two queens. They are a little bit dressy and do often cause trouble, but having some real experience to your credit you ought to be able to build a queen of a queen. Then, too, a difficult problem boldly tackled by constructive thinking is often ridiculously easy. Cut the eight slots in the rim of the top in the same manner as you did on the castle. Polish well and cut off.

Now for the four knights. Again a hard problem tackled with energy and confidence is more than half won. Prepare the blocks of wood 1¼ in. by 1¼ in. by 3¼ in. in size. Cut a piece from each side of one end of the block, a piece $\frac{1}{16}$ in. thick and 1¼ in. long. This will leave on the stock a middle piece ⅜ in. thick, 1¼ in. long and wide. With a narrow chisel or with a carving tool proceed to carve the head of the horse as nearly like the figure shown in the drawing. The unskilled boy may be permitted to clean up the head with a file and sandpaper. Now give the entire piece three coats of white shellac, allowing each coat to become thoroughly dry before applying the next. If desired, the piece may be rubbed with oil. The base may now be placed on the screw chuck and turned, polished and cut off.

You now have as fine a set of chessmen as you could wish for. The set should afford you and your friends many an interesting evening of play.

DOLL'S CUPBOARD

Leon H. Baxter, Hudson, Ohio

This interesting piece of doll furniture will delight the heart of any little girl. If the drawing and sketch are examined carefully as the pieces are made, a better understanding of the construction will result.

The top piece is first made ½ x 5¼ x 16⅜ in. and a ⅛-in. chamfer made on the front and two ends.

The two sides to the upper half of the cupboard are next made ½ x 5 x 11½ in. The curve on the front edge starts about 6 in. down from the top. The narrowest point is 1¾ in. wide and then sweeps out to 4 in. wide at the base. This is practically a free-hand curve and after one is cut out with a coping or a turning saw and filed and sanded to a finish, the second can be exactly duplicated by laying the completed side on the second piece and tracing the outline.

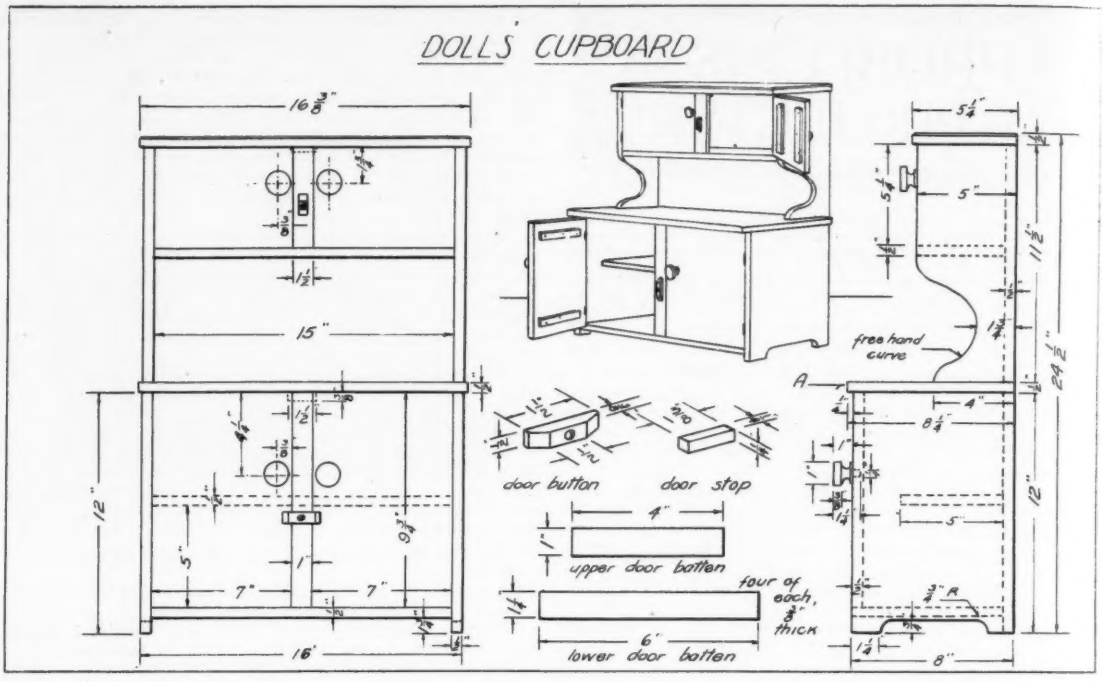
The shelf is ½ x 4½ x 15 in. Take care that all pieces are cut exactly to dimension and are true and square on the edges.

The upright piece between the doors is ½ x 1½ x 5¼ in. The doors are each ½ x 5¼ x 7 in.

The small piece which the doors shut against is ¼ x ¼ x 1⅜ in., as shown in the detail.

The door battens, for reinforcing the doors are ⅜ x 1 x 4 in. The wood button which holds the doors closed is ⅜ x ½ x 1½ in. The back piece of the upper half of the cupboard is fitted carefully between the sides, and if all other dimensions have been accurately worked out, it should be ½ x 11½ x 15 in.

Piece A, or the upper part of the lower section of the cupboard, is next made ½ x ¼ x 16⅜ in. The two sides are ½ x 8 x 12 in. The bottom edge is shaped as shown in the drawing by measuring in 1¼ in. from the edge and ¾ in. up from the bottom and cutting out



DETAILS OF DOLL'S CUPBOARD

with coping saw. Another method of doing this would be to make both sides in one long piece first, ½ x 8 x 24 in. Square a line across the width, 12 in. from the ends. Measure in 1¼ in. from both sides and using an expansive bit, set with a diameter of 1½ in., bore holes along this line. Saw the piece in two on this center line and chisel to a smooth edge. Finish with file and sandpaper. The shelf is ½ x 5 x 15 in. The upright piece between doors is ½ x 1 x 9¾ in. The bottom board is ½ x 7½ x 15 in.

Each door is ½ x 7 x 9¾ in. Door battens are ⅜ x 1¼ x 6 in. The back piece, which is nailed between the sides, is ½ x 12 x 15 in. The door stop is ¼ x ¼ x 1⅜ in. The door button is ⅜ x ½ x 1½ in.

The door knobs are best turned on a lathe to dimensions shown. They may be made, however, by cutting from a piece of round wooden rod, or dowel, and shaping to suit individual fancy.

Sand all pieces carefully with the grain of the wood.

The assembling is done as follows: All work should be joined by using 1¼ in. No. 17 brads and glue—hot glue preferably. Glue and nail the top to the two sides, allowing a $\frac{3}{16}$-in. overhang on the ends. About four brads should be used on each side. Attach back board in similar manner using about 6 brads. The shelf should next be attached, 5¼ in. down from the underside of top. Nail in from the outside, taking pains to see that shelf sets tightly against rear wall and that nails strike fairly in the center of edges of the wood.

Place this frame on the top A (see side view) and glue and nail in place. Care must be taken not to split off the lower part of the curved section.

The lower section is next assembled separate from the upper part.

Nail and glue the ends to the back piece and then place bottom board 1¾ in. up from lower edge and attach in place.

Attach shelf 5 in. up from bottom board.

On upper edges of sides and back we attach joining strips with ¾-in. No. 6 screws.

The two end strips are ½ x ½ x 6 in., and the back strips ½ x ½ x 14 in. Holes should be bored for two screws to attach strips to sides and three to attach strips to back. A like number of holes should be bored on the adjacent sides of strips to allow for screwing the lower section to the underside of piece A. All holes should be countersunk and ¾-in. No. 6 screws and glue used, taking care the strips do not extend above upper edges. Now by turning the upper section upside down, the lower section may easily be glued and screwed in place. See that the work is evenly placed before putting in screws.

Attach both pieces that go between doors in upper and in lower parts. See that these are square and true before nailing in place.

Glue the small door stops in place, where shown.

Make the wood knobs and attach where indicated on drawing.

The door buttons, after being made, should have a hole drilled for a ¾-in. No. 6 round-head blue screw. Attach this where it looks well, placing a small washer between button and place where attached. This is to prevent the button leaving circular scars on the doors when in use.

After making door battens, attach them with glue and about five ¾-in. No. 17 brads, placing them as shown in sketch, to go across grain of wood. They should be attached about 1 in. from and parallel to the edge of door.

Set all nails with a nail set and fill holes with beeswax. Sand again, all over.

In attaching doors use 1-in. brass-butt hinges, cut into door edge. Place hinges on the upper doors, 1 in. from upper and lower edges, and on the lower doors 1½ in. from the edges.

Apply a coat of white undercoat primer and allow to dry over night. Sand lightly with fine sandpaper held under finger tips and apply first coat of white enamel. Allow this to dry over night, sand again, and apply final coat. When dry, this may be left as it is, or rubbed down with pumice stone and water on a burlap pad. This gives a smooth, soft finish.

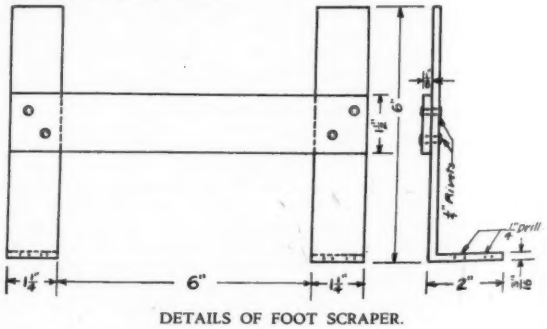
FARM MECHANICS—V.

Fred Short, Barron, Wis.

METAL WORK

As so many farm tools and much farm machinery, as well as household appliances, are made of metal, it is desirable that a course in farm mechanics should include some metal work. Especial attention should be given to the repairing of metal. Soldering should be done to enable the pupils to repair tinware and light metalware. Kitchen utensils and other appliances are often discarded when a few minutes' work with a soldering iron would make the necessary repairs. A little work in the filing, bending, and riveting of cold metal should be done especially as applicable to repairwork.

If a forge is available, some instruction and practice should be given in the shaping, bending, and twisting of hot metal, and some simple welding may be done.



DETAILS OF FOOT SCRAPER.

Although the main objective of this part of the course is repair-work, there are many simple things which can be made of odd pieces of iron usually found about any farm. For new work of this kind a forge should be available, but much metal work can be done without one.

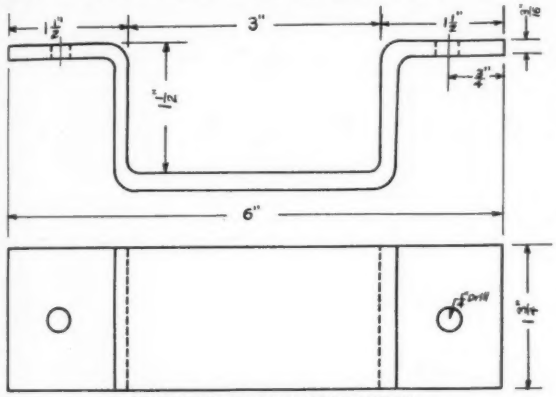
A good machinist's vise should be included in the farm-shop equipment and one or two pairs of tongs which can be made by the pupils. Files, cold chisels, center punches, and hammers must of course be an essential part of the equipment. The accompanying drawings show some simple projects which can be made in any farm shop and are very desirable additions to farm equipment.

Foot Scraper

The scraper shown in this drawing can be made from pieces of iron usually found in the farm scrap pile. The crosspiece can be riveted to the uprights as shown. This does away with the necessity of welding. It can be set in the fresh concrete if a new step or walk is to be built, or it can be bolted to a wooden step or walk. It may be fastened to a concrete step or walk by drilling holes in the concrete with a cold chisel or brick chisel, and using lag screws with expansion shells to fasten the scraper down. This is a useful and sanitary device and should be found at the back door of every farm home. Its use soon becomes habitual, much labor is saved, and there is more cleanliness in the home as a result.

Wagon Stake Iron

This project is again one that can be made from scrap material. Stake irons often are broken off and lost from the rack, so that it is a good idea to make a few in spare time to be attached when needed. In case the bolt holes in the rack become much worn, a plate of strap iron with holes the right size may be screwed to the rack stringer one on each side. The stake iron is then bolted to the rack through these irons.



DETAILS OF WAGON STAKE IRON

GARDEN TRELLISES

Frank P. Wentzel, Hershey, Pa.

The accompanying sketches of garden trellises are adapted to use around the home, being simple enough in construction for any seventh- or eighth-grade boy to make. The lumber is cypress—on account of its exposure to the weather.

The shape of No. 1 trellis can be governed by driving nails into the floor and bending the slats into position until the strips are nailed across. It should be bolted to a locust post which has been driven into the ground. Nos. 2, 3, and 4 should be braced against the porch or house with a piece of angle iron.

A FOLDING KITCHEN STOOL AND STEP LADDER

C. B. Hilliard, Instructor of Industrial Arts, Ely, Minn.

With the beginning of school in September you will be casting around to find suitable grade projects, and, if you are looking for a group project which combines real interest and educational value, you will find it in this folding kitchen stool and stepladder.

I believe the first and foremost job of the teacher is to get the boys to thinking about their project, and because of the design and construction of this piece it is absolutely necessary that the boy must do some thinking, as the pieces for this stool are all cut right and left, and the boy must be careful about the possibility of mistakes.

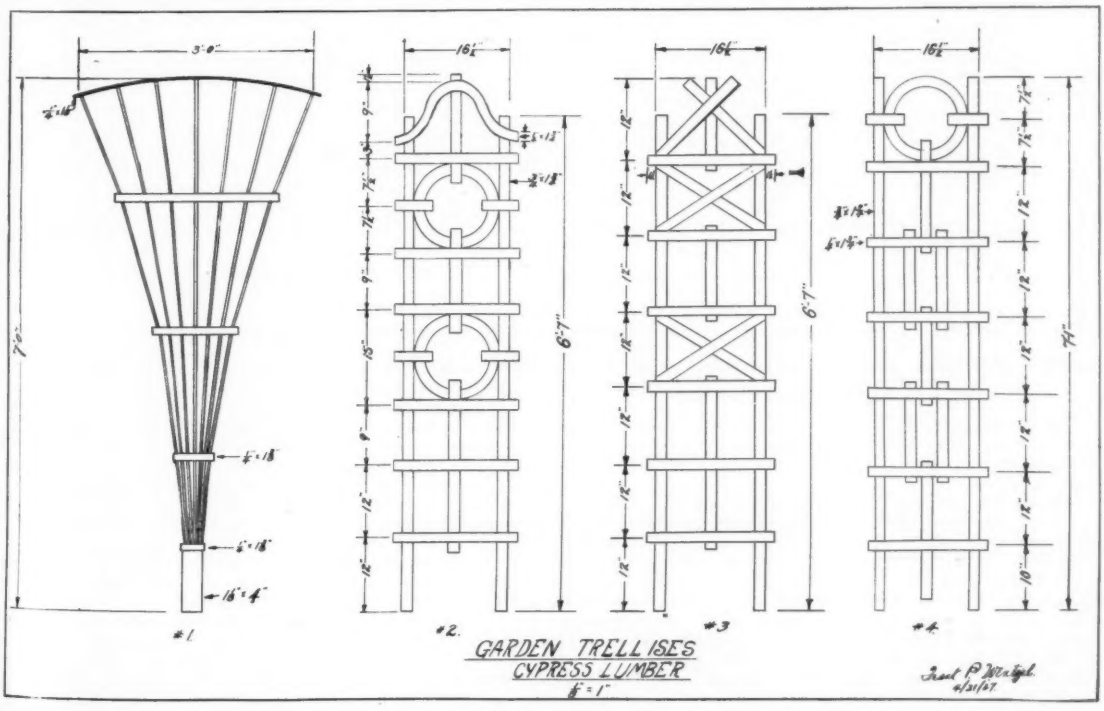
One of the handiest and most useful articles about the home is this folding stool and stepladder. It is made of hardwood and is so designed as to present the greatest possible strength and the most serviceable features. While it is not unduly heavy, yet it is sufficiently strong to stand many years of hard use. The top is made wide enough to be used as a stool. The method of attaching the legs with hinges affords strength which can hardly be provided by any other means.

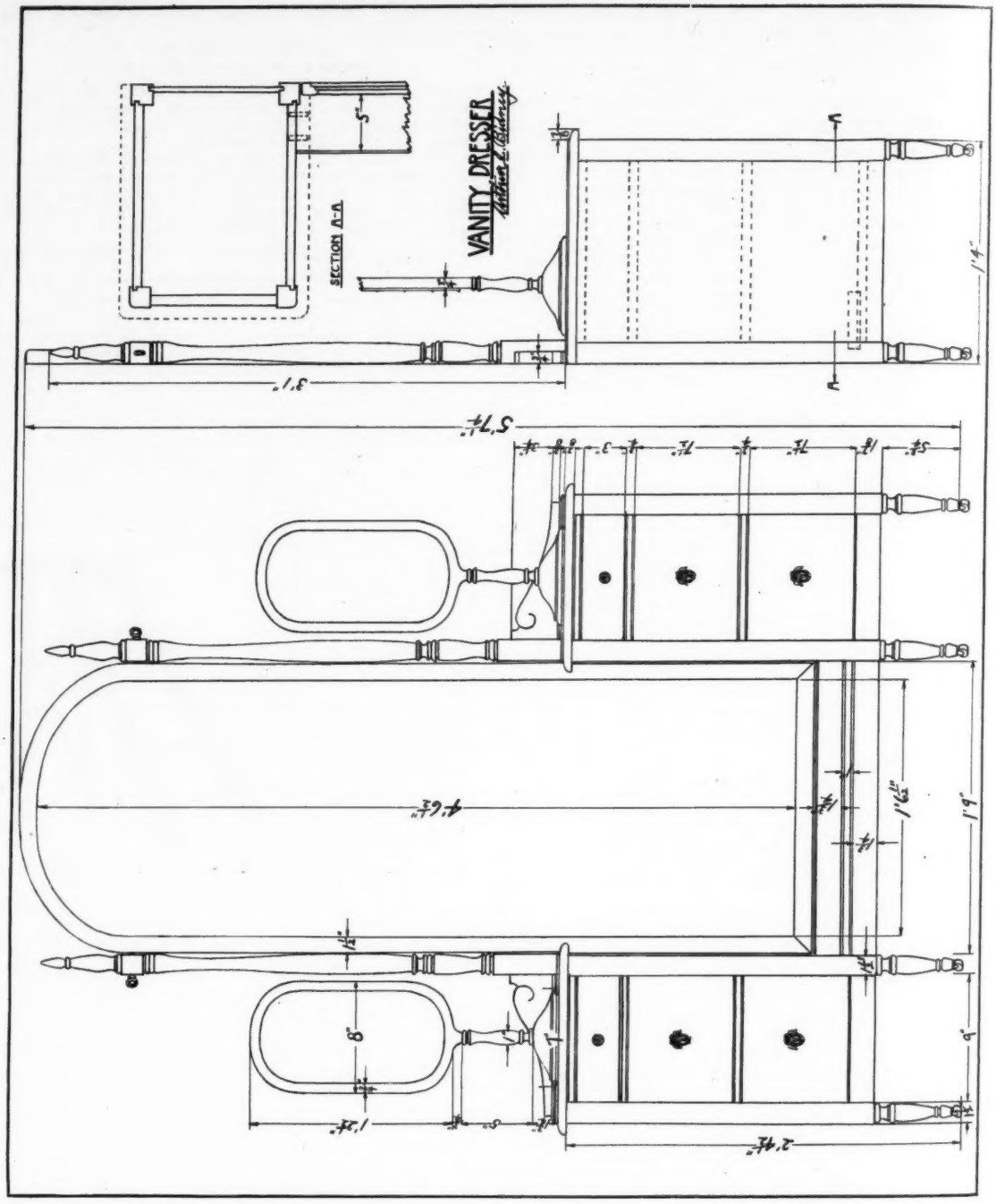
I do not give a working drawing to the seventh- or eighth-grade boys in the form of a blue print; I use a model to demonstrate from, and then draw full-size details on the blackboard as the work progresses.

List of Materials

2	sides	¾ x2¼ x25
1	step	¾ x3½ x 9
1	step	¾ x3½ x10½
2	supports	¾ x1 x22½
2	cross braces	¼ x ¾ x20½
1	crosspiece	¾ x2 x 9
1	top	¾ x9 x12
2	iron braces	⅛ x ¼ x11
4	1-in.-wide butt hinges.	

FOLDING KITCHEN STOOL AND STEP LADDER.





VANITY DRESSER, BENCH, AND BEDROOM TABLE

Arthur E. Bidney, Shorewood, Wis.

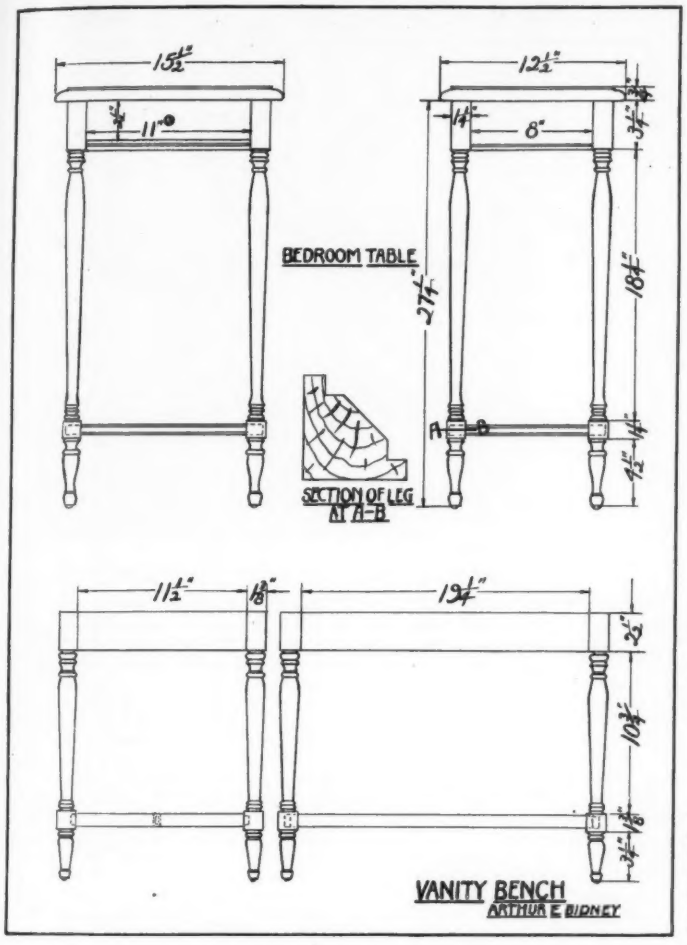
The accompanying drawings and photographs of a vanity dresser, bench, and bedroom table were designed and constructed by the author in the manual-arts department of the Milwaukee Normal School.

Manual-training projects have changed considerably in the last few years, from the heavy, oak, mission type to that of lighter furniture with careful design and good taste. Design as applied to furniture should make the student appreciate good design and create a feeling for the artistic types and styles. Advancement in design lies in the ability to use suggestions which may come to the student from many sources, such as newspapers, furniture catalogs, and magazines. Freehand sketches with only proportion in mind should be worked out first, and then mechanical and perspective drawings should be made to scale. The latter give one an idea of what the finished projects will look like. Students should also be made to make detailed and full-size drawings.

Projects of this nature should be accomplished by the more advanced high-school student who has attained some degree of skill and knowledge in woodturning and cabinetmaking. They present problems that involve a number of machine and hand-tool operations, and good problems in mechanical and perspective drawings. Of course, there are some who could not undertake a project of this nature because of the expense of hardwood, mirrors, and upholstery supplies.

The vanity dresser, bench, and table really present nothing new in the way of construction. They are constructed of American black walnut, but of course, if this material is not available, good results may be obtained from gumwood or birch.

For a finish the so-called Italian finish was used. After having sponged the project to raise the grain, it was sanded with 00 sandpaper, then the stain was applied, in this case a dark black walnut stain. When dry a coat of thin white shellac was applied, the piece



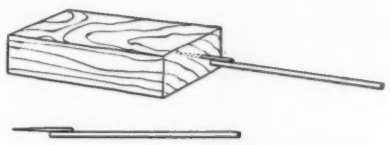
was again sandpapered with 00 sandpaper and another thin coat of shellac was put on and sanded. Then thoroughly mixed powdered rottenstone and rubbing wax were rubbed into the pores of the wood. It is necessary to be careful not to cover too much of the project before rubbing off, as the material soon dries hard and it is then difficult to remove the surplus. After this several coats of good rubbing wax were applied and rubbed down to a good finish.

A SCRIBER

G. I. Eagleson, Grafton, Pa.

The accompanying cut shows a scriber which was constructed from a used Victrola needle. A block of soft wood is used to hold the needle while it is being soldered to a piece of No. 11 galvanized wire. A drop of solder is all that is needed.

The problem is one that may easily be constructed by any boy in the shop, and its practical nature has given it an added value as a shop project.

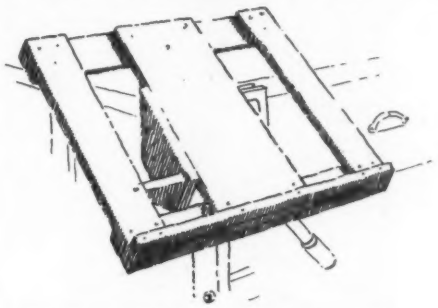


SCRIBER CONSTRUCTED FROM A USED VICTROLA NEEDLE.

A DRAWING-BOARD SUPPORT

W. W. White, Waterloo, Iowa

The accompanying cut illustrates a drawing-board support which has been worked out in the manual-



COMPLETED DRAWING-BOARD SUPPORT.

training shop of the Waterloo schools, by the students under the direction of the instructor. It has proved satisfactory in use.

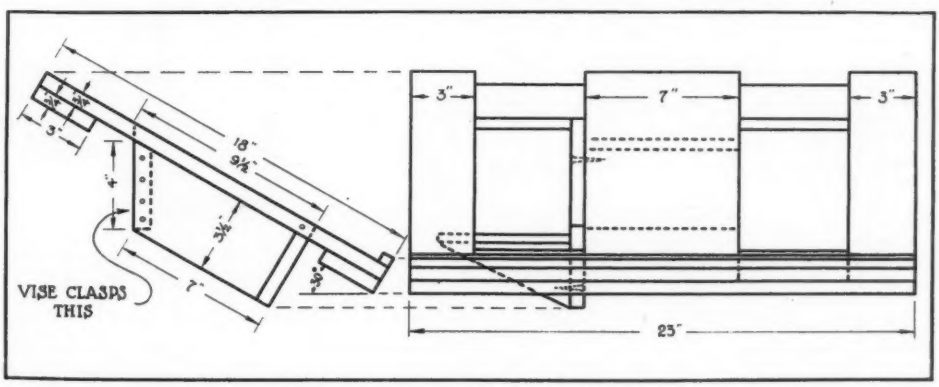
A ROTARY MOTOR AS AN AVOCATIONAL PROJECT

Stephen L. Klevay, Machine-Shop Instructor, Sheboygan, Wis.

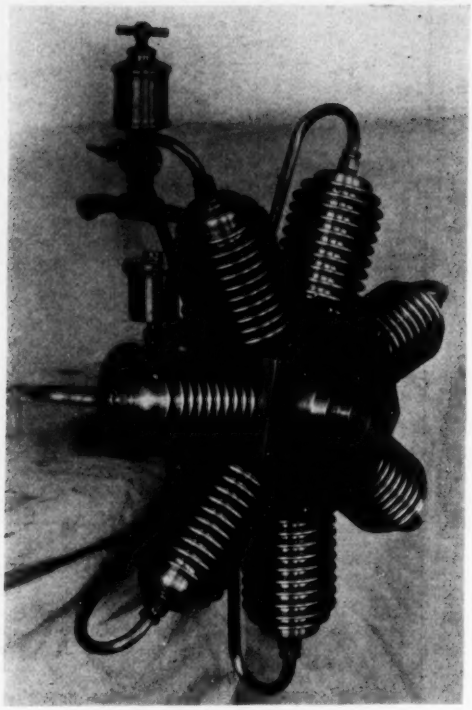
Avocational activities have an important part in the worthy utilization of leisure time. A certain amount of spare time is wasted by most students, because they have not learned to use it profitably. Organizations and clubs in the schools do make an attempt to utilize the students' spare time through their varied activities, but fail to reach all of the students. The shops, however, are are in a position to reach the majority of the students, since their activities involve the actual doing or making of things. The average normal boy likes to make something. The problem is to get him interested in some work that will suit his taste. The group project illustrated is a fair example of what a group of average students is able to do once their interest has been aroused and favorable conditions furnished to work out their problem.

A group of students in the Sheboygan Vocational School have organized a so-called "Machinists' Club" for the purpose of discussing current related topics, also for the purpose of spending at least two hours a week of their spare time actually working in the shop, and further to make a shop visit once a month to some industrial establishment.

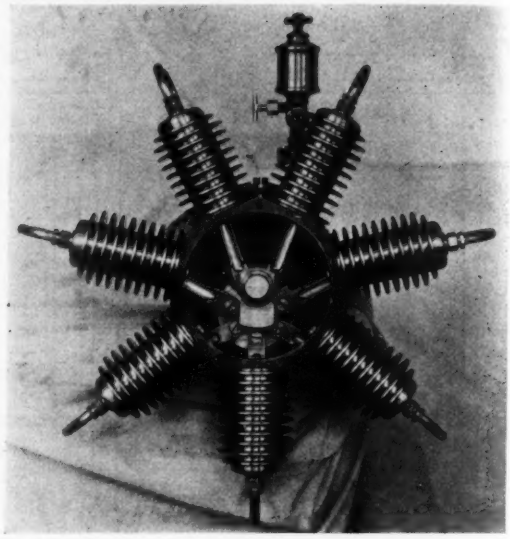
The boys' first problem was a seven-cylinder-rotor aeroplane motor. The motor is original in every detail and was designed entirely by the boys. They worked out their own dimensions, the tracings, and the wooden patterns. This was not done without a



DETAILS OF A DRAWING-BOARD SUPPORT.



THE MOTOR READY TO RUN.



THE MOTOR WITH THE FRONT BEARING REMOVED.

great deal of research work, delving into technical literature in search of formulas and approved methods of construction. Further, they machined and assembled all the parts and have done most of the work in their spare time after school.

This project has given the boys good machine-shop practice, since it is large enough to offer practical machine and benchwork. The engine is of the rotary type, the crankshaft being stationary while the cylinder and the housing are revolving. It is driven by compressed air. It has seven cylinders with 1⅜-in. bore and 2-in. stroke. The swing is 20 inches and the width of the complete project is 9 inches.

The cylinders are turned out of solid, cold-rolled steel and are screwed into the housing. The cast-iron housing is indexed and milled on the milling machine, the holes bored and threaded on the lathe. The front and rear blades are bushed with bronze bushings and are fastened on the housing with fillister-head screws. The pistons and piston rings are made of cast iron, while the connecting rods are machined out of ⅜-in. square stock. The crankshaft is turned out of a solid piece of steel and drilled for oil feed.

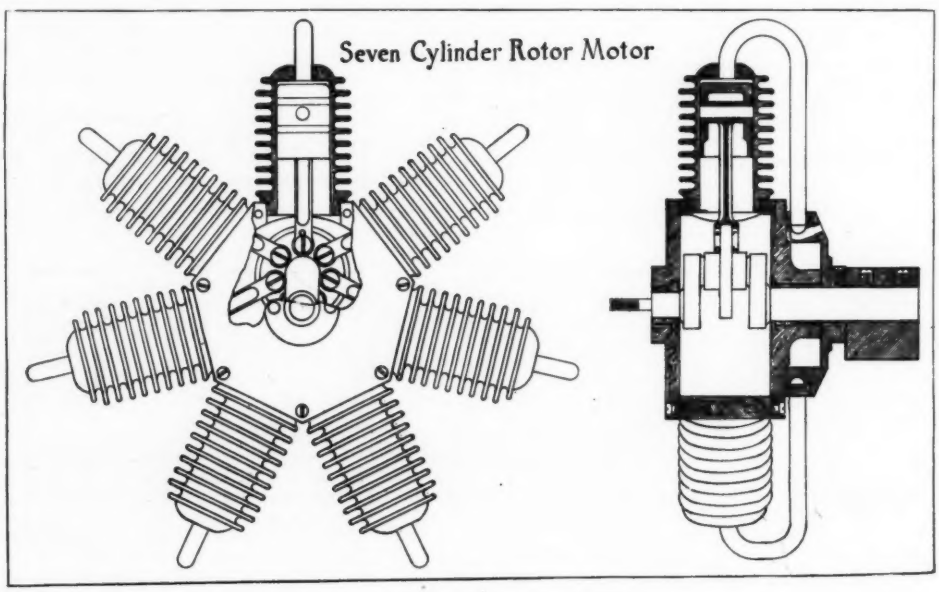
The mother connecting-rod bearing is made of two pieces, held together with a ring over which fit the forked ends of the connecting rods. The mother rod is pinned into the bearing, but the rest of the connecting rods are free to swing. The compressed air is forced into the stationary timer and from there through the copper tubing into the cylinders. The engine is timed in rotation, three of the pistons receiving pressure all of the time. The exhaust is forced through the feed pipe back into the timer and out of the exhaust opening. The crankshaft bearings and the connecting-rod bearings are lubricated through the crankshaft. The pistons are lubricated by a force-feed oil pump, the oil being fed right into the line.

A project of this kind offers the boys incentives to utilize spare time. It gives them an opportunity to express themselves, to use judgment, and to develop a liking for the trade.

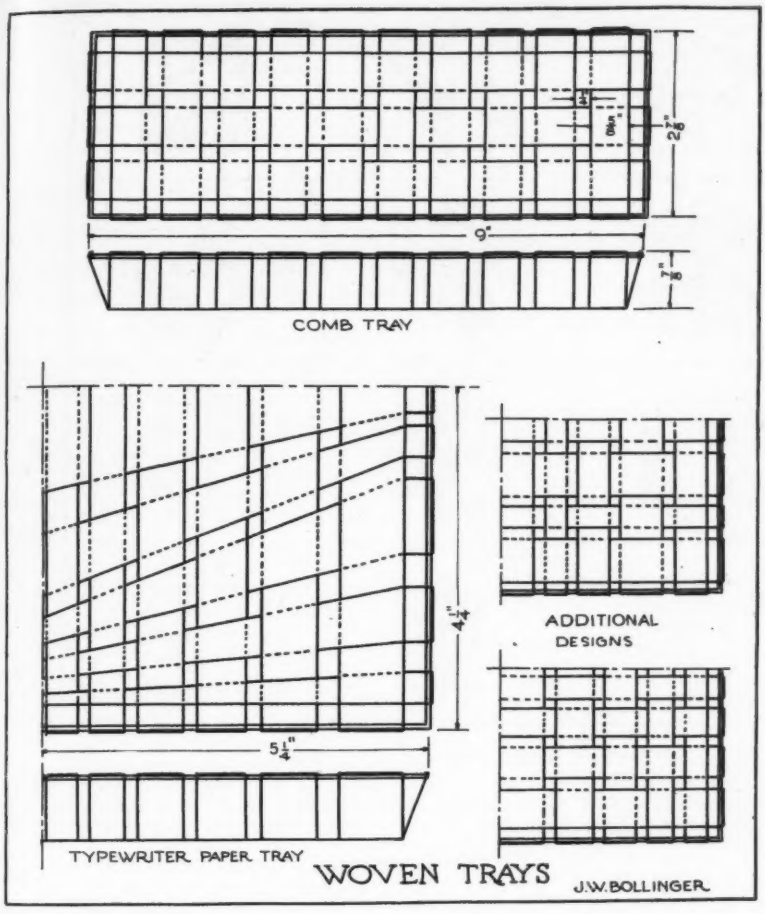
WOVEN TRAYS

J. W. Bollinger, Theodore Roosevelt Jr. High School, Tulsa, Okla.

These woven trays can be made out of narrow edgings of IX tin plate. Strips from ½ to 1 in. wide, which might otherwise have



FRONT VIEW AND SECTION OF THE MOTOR.



been thrown away, can be combined in this way to produce interesting results. The pieces are held together by a wire edge around the top, the strips being sweat-soldered to the wire. Here and there two strips are touched together with solder.

The comb tray shows the simplest way to make such a tray. Strips of uniform size are uniformly spaced. This tray might also be called a pen tray. To increase the interest, strips of various widths may be combined to produce varying results, as in the additional designs shown. The typewriter-paper tray (shown in quarter-section) shows how the design may be made much more complicated. If several of these trays, which fit standard size typewriter paper, are made, they can be arranged to rest one above the other by means of wire "feet" soldered to the wire edge. In place of being called a paper tray, this problem could also be called a sandwich tray, or a dessert tray. Various sizes and shapes of this problem can be worked out, and named to suit.

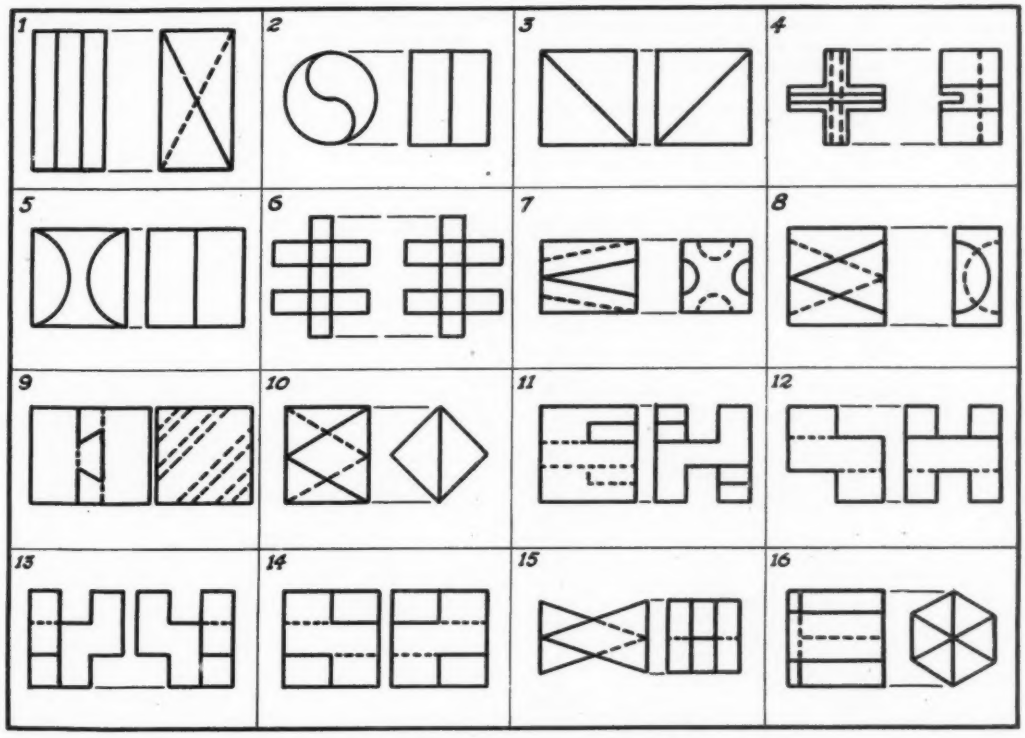
The finished trays can be enameled or not, depending on the use to which they are to be put. A comb tray would be better enameled; a typewriter tray is better not enameled.

MECHANICAL DRAWING READING EXERCISES

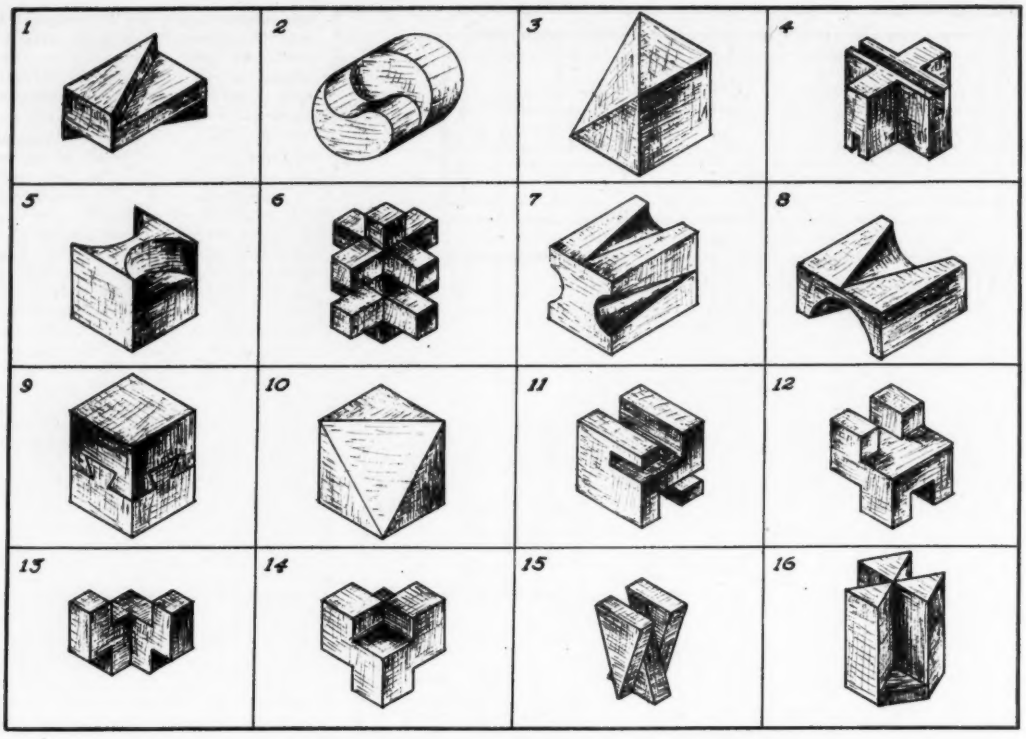
H. T. Weatherby, Montgomery, Ala.

The desire to work with problems and tests seems to be inherent in the human mind, and the working of them whets our wits and gives us keener thinking processes.

In mechanical drafting, the power to visualize is almost the whole sum and substance of its value. We may acquire skill in the handling of instruments and never get beyond the tracing of other men's drawings. The teaching, then, of visualization in our drawing classes, should begin with the first simple working drawing. The boy should, if possible, be made to see how the object *looks*.



MECHANICAL DRAWING READING EXERCISES. Answers Overleaf.



ANSWERS TO THE MECHANICAL DRAWING READING EXERCISES.

It is not as easy to get results as it sounds. It is particularly convenient in a drawing class for students to copy. Often they do it unconsciously and it is only when we test them that we find that they have only a very limited imagination when it comes to visualizing, or *seeing* a working drawing.

As early as possible in the drawing courses, it is well to introduce the various mechanical pictorial methods of representing an object. A clear understanding of the difference and value of each of the different methods should be a part of the boy's mental equipment. Artistic ability is not a requisite and this should be clearly understood by the students. By the middle of the second year, each working drawing should be preceded by a freehand pictorial pencil sketch.

As an aid to this, working drawings that are simple to begin with, and growing more difficult with the progress of the pupils, should be presented from time to time as reading or sketching problems or tests. The results in the course of a few months will be apparent, and the interest displayed by the pupils will be amazing.

The problems presented are just a suggestion. There is no limit to the simple drawings like these, which can be worked out. Try them out on your advanced high-school classes and observe the interest and enthusiasm that develops.

A CHILD'S FOLDING TABLE

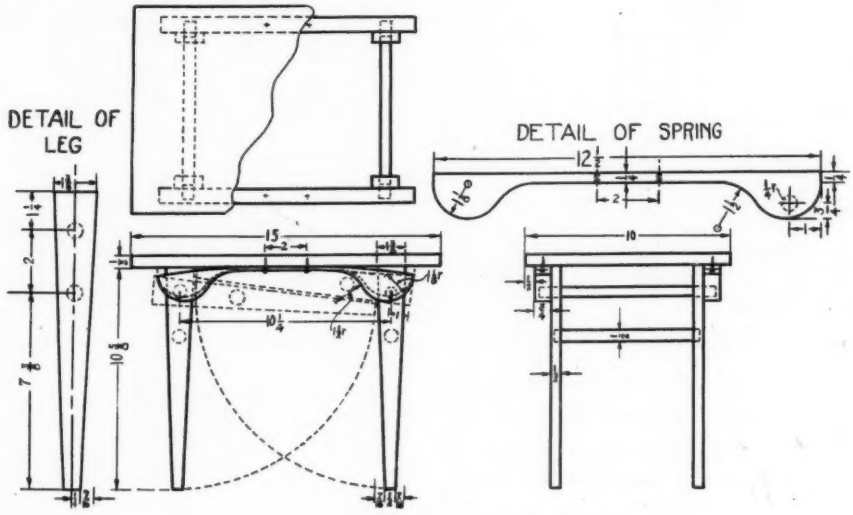
C. F. Zaenglein, Circleville, Ohio

The table illustrated is practical in construction, and has stood the test of home use during four years. It is a good problem for a seventh-grade boy.

Hardwood should be used, and the wooden spring should be made to exact size as shown in detail of drawing, as this must have the right tension to hold the legs in place.

Stock Bill

Pieces	Sizes
4	½ x 1⅜ x 10⅜
1	½ x 10 x 15
2	½-in. dowels 8½ in.
2	½-in. dowels 7 in.
2	¾ x 1⅜ x 12½



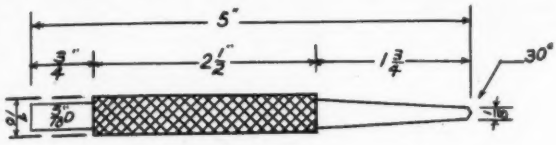
DETAILS OF A CHILD'S FOLDING TABLE.

AN INSTRUCTION-SHEET IN MACHINE-SHOP PRACTICE

George C. Donson, Washington, Pa.

Objectives

1. To develop skill in centering up and straight turning.
2. To give information and develop skill in straight turning.
3. To obtain an idea of how a machinist's punch should be tempered and to acquire some skill in grinding the point.



Information Pertaining to Unit

The material for making this punch is Diamond octagon tool steel. The cost is 14 cents per pound and care should be exercised so that the material is not wasted.

References

How to Run a Lathe—South Bend Lathe Company.

Read the blue print to the right as you enter the door, "HOW TO BECOME A GOOD MECHANIC."

Applied Science

Tool steel can be tempered and C. R. S. can be case-hardened only.

What is meant by "case-hardening"? See Machinery Handbook, page 1302.

Why should the head of the punch not be tempered?

List of Operations

1. Saw off piece of octagon tool steel, 5½ in. long.
2. Center up and drill centers with countersink drill in drill press.
3. Turn entire length to $\frac{7}{16}$ in. diameter.
4. Grind shouldering-up tool and turn shoulders to the size indicated in the sketch.
5. Knurl the barrel of the punch.
6. Set taper on the Reed lathe ⅛ in. to 1 ft. and turn the taper to ¼ in. diameter at the point.
7. File, using safety-edge pillar file with handle.
8. Polish, using 00 emery cloth.
9. Grind the point to an angle of 30 degrees.
10. Temper by heating in the forge to cherry red and cooling in fish oil.
11. Polish again and rub with machine oil.

Applied Mathematics

Look up in the American Machinist Handbook the weight per foot of ⅜-in. octagon tool steel.

What is the cost of this punch at 14 cents per pound? Ans.....

What would be the price of this punch if you were to purchase it from your hardware merchant?

Tools, Machines and Equipment

The make and the place of manufacture of the lathe you are using should be noted.

Is it quick-change or otherwise?

Is there a taper attachment? Is there an automatic stop?

How can you tell if the live center and dead center are not in alignment?

Why should you always use a handled file while filing revolving work?

What is a good method for lacing a belt for use on a lathe?

Applied Drawing

How far should dimension lines be placed from the outline?

How should fractions be made?

Safety and Hygiene

Before beginning work on the lathe see that the lathe is clean.

Wipe the sheaves with a piece of waste and apply a few drops of machine oil.

Inspect the front and rear bearings to see if they need oil.

Neckties should be held from dangling by a necktie clasp.

Loose sleeves should be rolled up before commencing work.

The cutter in the tool holder should be guarded as there is much danger of being hurt here.

Do not leave your machine while it is in operation.

Trade Terms

Choking the tool; taper; knurl; temper; sheaves; shouldering-up tool; safety-edge file; countersink drill; C. R. S.

Your Name.....

Time in periods required for you to make this punch.

.....Periods.

A CLEAN-UP CART

C. C. Sadler, Altoona, Pa., and J. A. Miller, New Kensington, Pa.

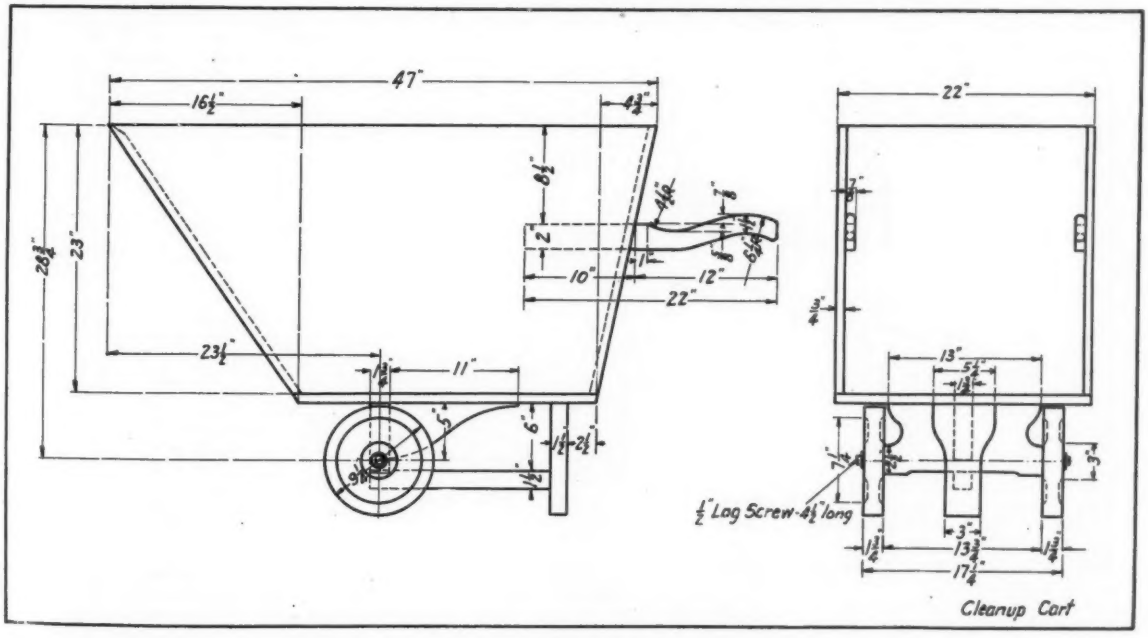
The clean-up cart shown in the accompanying drawing is a useful project which can be handled to advantage in the woodworking course. The cart can be used for hauling away refuse matter, small pieces of lumber, and (where a blower system is not installed) sawdust.

It is perfectly balanced. When loaded it will not tip over, yet it takes a light touch to place it in position to receive its load. The slanting side, on which it rests while being loaded, should have a piece of tin or sheet steel on the tapered edge so that material on the floor may be swept into the cart without difficulty.

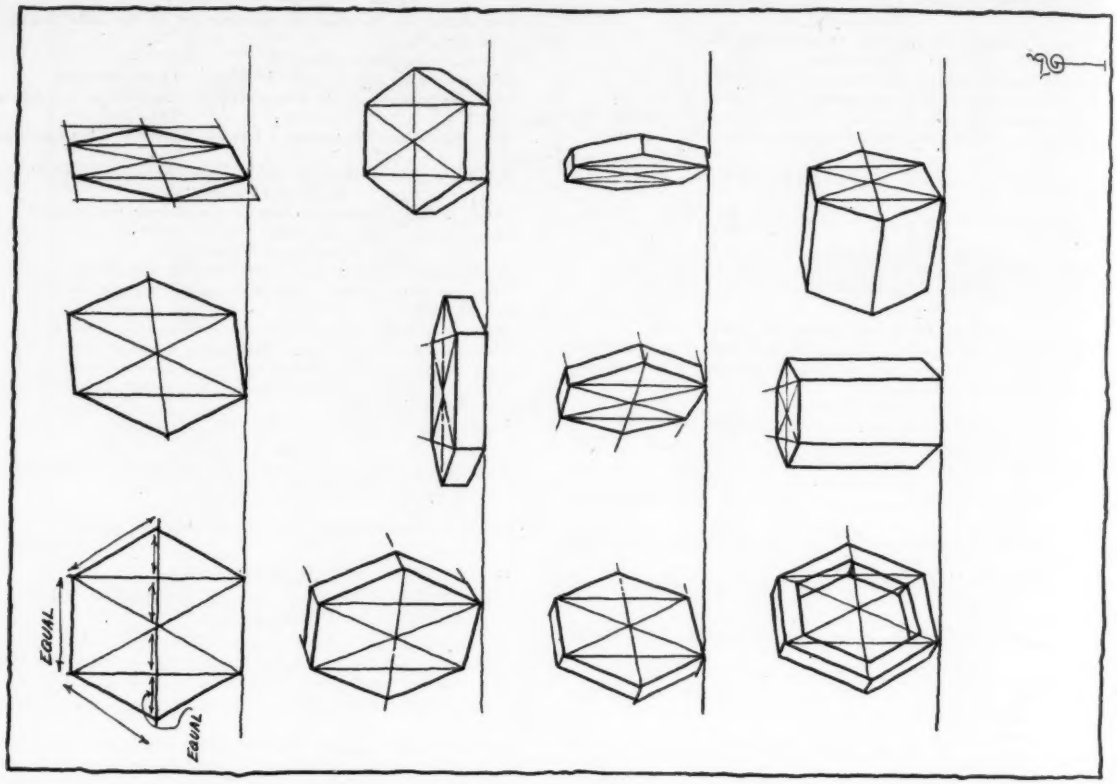
The wheels may be made of oak, or cast-iron wheels may be designed if desired. They are held in place by a washer and a ½-in. lag screw 4½ in. long. The supporting pieces on the bottom should be made of oak because of the strain, but the body will be strong enough if made of pine or other light wood, ¾ in. thick.

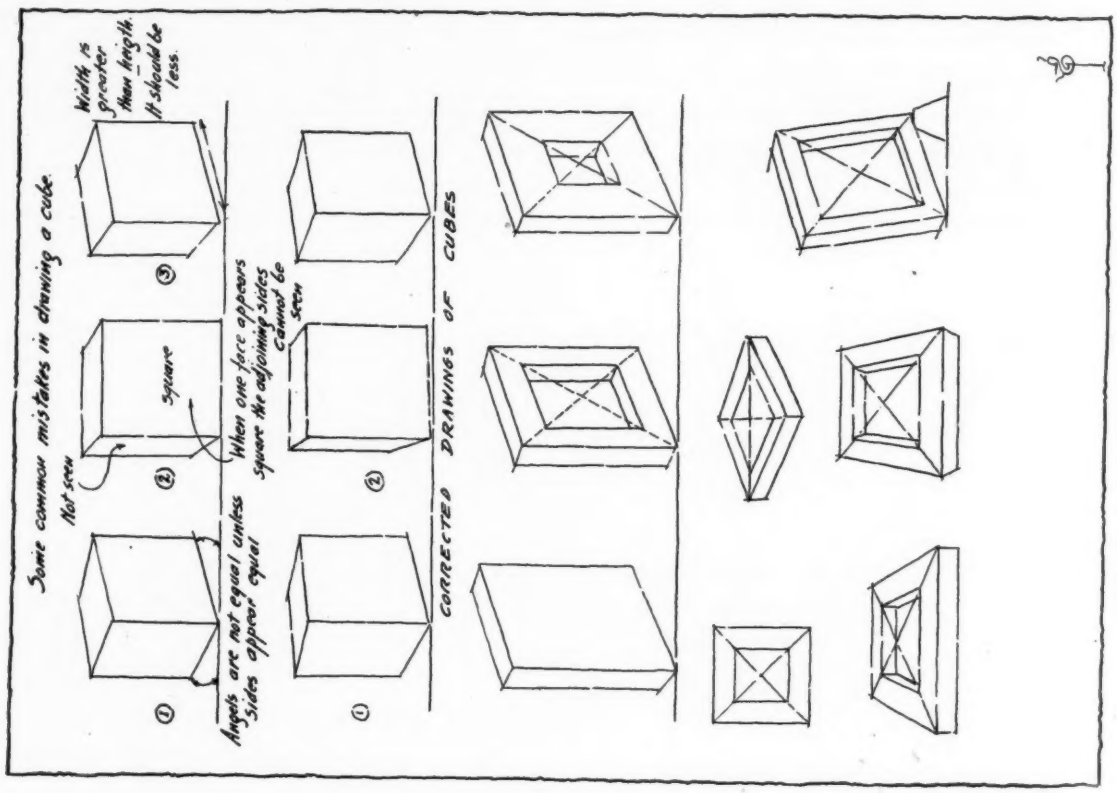
The corners of the cart should be filled with a triangular piece of wood to do away with the collection of dirt.

A cart of this kind will make shop sweeping, cleaning, and carting away of refuse a real pleasure.



DETAILS OF A CLEANUP CART FOR THE SCHOOL SHOP.




Some common mistakes in drawing a cube.
Not seen
Square
Width is greater than height. It should be less.
Angels are not equal unless sides appear equal
When one face appears square the adjoining sides cannot be seen
CORRECTED DRAWINGS OF CUBES

SUGGESTED PROBLEMS IN SKETCHING, BASED ON THE SQUARE, THE CUBE, AND THE HEXAGON. By Alfred G. Pelikan, Supervisor of Art, Milwaukee, Wisconsin.

THE CUBE, AND THE HEXAGON. By Alfred G. Pelikan, Supervisor of Art, Milwaukee, Wisconsin.

AN OXFORD MAN SURVEYS AMERICAN VOCATIONAL TRAINING

Irma L. Wallace

John Whitley, the first British research student to receive the Irving T. Bush Scholarship, has recently left the United States after a four months' survey of the progress of vocational education. Mr. Whitley is an honor graduate of Oxford and was selected for highest qualifications from among one hundred candidates by the City of London Vacation Course in Education. The scholarship was established by Irving T. Bush, president of the Bush Terminal Company, to promote closer cultural relations between European countries and America.

Mr. Whitley thinks that in the matter of vocational education England has a great deal to learn from America. In an interview, just previous to his return to Oxford, Mr. Whitley stated that throughout his tour in this country, his object was to collect experiences in vocational fields which might contribute to the English system rather than to criticize American performances. However, he stated that vocational education throughout this country is not all that could be desired, as the problem is still new.

One of the pieces of work which Mr. Whitley felt to be the most outstanding is the recent development of the continuation school. Perhaps more than any other department this type of school has been subject to bitter attacks from employers, organized labor, and schoolmen. That vocational education has grown and established itself firmly in spite of these attacks reflects great credit upon American educators who have had the vision and perseverance to carry their project through. As an agency for upgrading the whole of America's juvenile employed, it is unique. Where industry has been able to realize the potential advantages of the continuation school, as in Wisconsin, some most effective vocational work is being done, according to Mr. Whitley.

"If ever continuation schools are resumed again in England," said Mr. Whitley, "we shall be able to begin, not inexperienced, as we should have done in 1918, but with fifteen years of American effort behind us. We shall be able, profiting by American experience, to anticipate the direction from which troubles may arise, and be able to meet them halfway. And moreover, conditions being very similar in the two countries, what you have found to be of great service to the youth of America after nine years, will probably be of equal service and meet the needs of English youth, too."

In the general field of industrial training, Mr. Whitley's object has been rather to attempt to evaluate the efficiency of certain types of training rather than to criticize the several phases of individual schools. America is faced with the problem of training an efficient body of workers. The federal vocational act was passed for the purpose of stimulating the provision of education to this end, and during the last nine years, it has stimulated a variety of experiments, few of them conclusive in their result, but all of them contributing experience which will eventually solve the problem. Mr. Whitley stated that nowhere in the country did he find either similar institutions or like conditions, with the result that he was able to observe every type of experience, and to study how the difficulties of every type may be encountered. He was able to learn how instructional material is prepared; how organized labor is likely to react toward vocational education under various conditions; and what opposition may come unexpectedly from the regular school authority.

"In Wisconsin," said Mr. Whitley, "I was able to inspect perhaps the finest continuation school in the country, and to see an efficient program of apprenticeship training, organized and supported by a farsighted engineering firm. In Chicago, I saw an equally efficient apprenticeship system forced on unwilling employers by an enlightened trade union."

Mr. Whitley made a comparison of the relative merits of the all-day schools and part-time trade schools. The all-day school has long been a feature of the English educational system. London has some of the finest trade schools in the world, but cooperative work with industry and commerce has not been developed to the same extent as has been done in America. He stated that in the cooperative movement will eventually be found the solution of the problem of training for a variety of industries. Where the continuation school operates, as in Wisconsin, this cooperative work may be carried on effectively in that type of school. It becomes rather difficult, however, when a school has a program offering only four hours a week. In other areas, cooperating with many industries, or as at Beverly, Massachusetts, cooperating with one industry, has produced an effective piece of training.

In the field of commercial training, Mr. Whitley was particularly impressed by the cooperative work in retail selling which he found in various stages of development throughout the country but perhaps best organized in the Boston High Schools.

The problem of creating adequate facilities for vocational training confronts America like England and all other civilized countries. In olden days vocations were acquired by imitating others. The system of apprenticeship was adopted to safeguard skill, but apprenticeship finally gave way to special training schools. Vocational education in America is less democratic than general education. The prosperous and gifted may attend professional schools, but there are not enough schools available for the poor and untalented. Every year, forty million dollars are spent for stenographer-typist training and clerical training, but practically nothing for factory and mining callings. For the production of agricultural leadership twenty-five million dollars are spent annually, but not a dollar is spent to produce good "dirt farmers." America might well profit by the establishment of vocational training courses for poultry farmers, locomotive engineers, coal-mine diggers, streetcar drivers, tailors, and others.

Since it is not possible to accommodate all vocational schools together with general schools, it is suggested that some of them should be located in the country, in homes, in barns, and, in fact, wherever the practical work of vocations is carried on. It is maintained that one tenth of what is now spent for public-school education would be sufficient to provide for full-time training in all vocations, except farming and the liberal professions.

"NOW ASK ME ONE"

John F. Faber, Academy High School, Erie, Pa.

This is the second installment of questions on vocational education and industrial arts. It is believed that all of them have some information and value.

Questions

1. Name two psychological principles of learning.
2. In what centuries did the industrial revolution take place?
3. What is meant by the inductive method of teaching?
4. What trade study gives the best all-around industrial training?
5. What is the leading teachers' college of the East?
6. Where is the largest continuation school in the U. S.?
7. What were the first trade unions called?
8. What is meant by the deductive method of teaching?
9. Name three divisions of part-time education.
10. Name two main divisions of the graphic language of industry.
11. What shop organization offers the best opportunities for guidance and exploration in the small community?
12. What two national publications are published monthly in the interests of vocational education?
13. What is the threefold aim of education?
14. What percentage of the salary of an industrial-arts instructor in a city of 100,000 population is paid by the Smith-Hughes appropriation?
15. What is meant by the 6-3-3 plan of organization?

(See page 319.)

THE EASTERN ARTS MEETING

The officers of the Eastern Arts Association have announced that the next meeting of the association will be held April 17 to 21, 1928, at Hartford, Conn. The Hotel Bond will be headquarters for the meeting.

The convention in Hartford promises to be one of the outstanding meetings of the association. A committee consisting of Mr. M. W. Haynes of Jersey City, N. J.; Mr. J. Wiseltier of Hartford, and Mr. B. A. Adams of Springfield, Mass., has been appointed to have charge of convention arrangements. Mr. W. C. Wright, of Henry Disston & Sons, Philadelphia, Pa., is a representative on the council of the association.

Information concerning the convention may be obtained by writing to Mr. M. W. Haynes at 300 Communipaw Ave., Jersey City, N. J.

ECONOMY IN THE USE OF LUMBER

The United States Department of Agriculture, through the Forest Service, has called attention to a waste in the use of lumber in the manual-training departments of schools. A press bulletin issued by the department tells the story:

Manual-training teachers in the schools of the country and leaders in the boy scouts, camp-fire girls, and other organizations which conduct manual-training courses can do effective work in training students in the economical use of lumber, says the Forest Service.

In much of the work done in manual-training courses cheap grades of lumber can be used to just as good purpose as absolutely clear stock.

The Forest Service cites the example of a manual-training teacher at one of the junior high schools who instructed a pupil to buy 16-ft. clear boards a foot wide, which were cut up into short and, in some cases, very narrow strips, for the building of a set of shelves for a cabinet. This tendency to use clear lumber for such purposes is believed to be prevalent. This not only brings about an unnecessarily high expense to the students but runs counter to the present-day tendency for more complete and effective utilization of lumber. The small pieces called for by much of the manual-training work can be cut from low-grade lumber containing knots and other defects. To do so would be to help the movement for better utilization of low grades of lumber. Many industries that use small pieces of standard

sizes buy them from mills that salvage slabs, poor boards, and cull logs for this purpose. One of the greatest wastes of timber, the Forest Service declares, comes from our failure to find or devise uses for the lower-grade materials, and in some measure this comes from the American tradition of demanding the best lumber, no matter what use is to be made of it.

Contact with lumber dealers who regularly sell lumber to schools reveals the fact that a good many manual-training men are lacking in understanding of lumber grades or commercial sizes, and that they are generally inclined to purchase only the best grades and the largest sizes without regard to the element of expense. The purchasing agents of school boards in the larger cities make similar complaints.

Blunders of manual-training men in buying lumber that is wasteful is a serious error to be avoided. It is first of all a direct waste of money and of a natural resource, and it is, in the second place, a direct detriment to manual-training and vocational work. Lumber dealers and others who come in contact with such waste lose their respect and confidence in the teacher and in the entire movement which he represents.

ILLINOIS SOCIETY FOR VOCATIONAL EDUCATION WILL HOLD JOINT MEETING AT CHICAGO

The Illinois Society for Vocational and Practical Arts Education will hold a joint meeting with the Illinois Home Economics Association, November 11 and 12, at the Hotel Sherman, Chicago, Illinois.

There will be an exhibit of products manufactured by reliable firms doing business in the school field. The city of Chicago is a large field for educational products, and the addition of the entire state of Illinois, makes a combined field that is equal in buying power to any other territory in the United States.

Information concerning the meeting may be obtained from Mr. F. K. Phillips, 1127 Gresham Road, Plainfield, New Jersey, while data concerning the exhibits may be had from Mr. L. Day Perry, 2527 Blaine Place, Chicago, Ill.

SCHOOL BOARDS MUST MAINTAIN SCHOOLS FOR INDUSTRIAL EDUCATION

The city council of Superior, Wisconsin, took it upon itself last fall to cut the vocational school budget three thousand dollars with the result that the vocational school board found itself $3,000 short of enough money to carry the school through the school year. The director of vocational education, Mr. Rudolph Hanson, thereupon asked the state education department whether the school board had authority to borrow money for the purpose, and what procedure should be followed to enable the board to get the necessary money to carry on the school.

Replying to the vocational director's question, the department gave the following opinion:

"Under the provisions of Sec. 41.16, while the levy is to be made by the council, the amount of the levy is fixed by the board within the limits there fixed, and while the city council at Superior several times exercised the right to cut the amount of levy for that purpose, I never believed it could be legally done and I rather assumed that under the provisions of that statute the city might be required to turn over to the board the amount required and reported to be raised for that purpose even though the council attempted to levy a smaller amount.

"You inquire if the industrial board could now borrow enough to carry on the work for the balance of the year.

"Sec. 41.15 grants very broad powers to the board to enable it to carry out the provisions of the law and to make contracts necessary therefor. I think those powers are as broad as the powers granted to town boards which the supreme court held in the case of Bennett v. Nebagamon, 122 Wis. 205, included the power to borrow money for the purpose of carrying on the business of the town. The rule as laid down in that case is that 'in the absence of any restriction, the power to borrow money would pass as an incident to the execution of the general powers according to the well-settled rule that corporations may resort to the usual and convenient means of executing the power granted; for certainly no means is more useful for the execution of such object than that of borrowing money,' and the court there held because of that general power to borrow money to properly carry out the municipal functions that it would have the right to issue the bonds of the town to evidence the payment thereof.

"It is my opinion that this question comes within the rule and scope of that case and the power to contract the debts and the duty to maintain the school would carry with it the implied power to borrow money to enable it to perform that duty where no expressed restriction is placed upon the method of exercising that power.

"As to whether or not banks will loan their money to the board under the conditions and circumstances named I have nothing to say; that is a matter of business judgment and discretion which would have to be exercised by the banking officials under the circumstances.

"It may be that the money could be borrowed from other sources or that the school could be run for the balance of the year without cash arrangements, but those are problems that would have to be worked out by the board.

"I assume that the board is already under contract to pay the salary of the teachers and other expenses of the school which binds it as firmly to the obligation of the indebtedness as a new obligation for borrowing money to pay such indebtedness would bind it, so that so far as the taxpayers are concerned, it would be immaterial."

A VOCATIONAL APPRENTICE TEST USED BY THE VOCATIONAL GUIDANCE BUREAU, BERLIN, GERMANY.

Boys who seek positions as apprentices in the metal working trades in Berlin are asked to undergo aptitude tests. The boy above is bending wire in imitation of a form which he has been allowed to see and which he is expected to duplicate from memory. The wires mounted on the paper in the foreground represent work of boys and range in value from 100% at the left to practically zero at the right.

NEW BOOKS

Junior High-School Printing

By R. Randolph Karch. Boards, 97 pages. Issued by the Junior High-School Printshop at the Harding Junior High School, Steubenville, Ohio.

This loose-leaf book on junior high-school printing has been prepared by the author to meet a special need in this type of school, and has been found successful in use. Through its use, large classes have been handled with ease, and the instructor has had sufficient free time at his disposal to take care of the "necessary evil"—production. It gives the pupil a practical insight into the elements of the printing industry, outlines the content and processes in the work, and instils a knowledge of the tools and materials employed.

A wall chart used in connection with the course provides a method of keeping records and grades in the classes. This chart is checked by the instructor prior to each period and shows the pupil what he is to do, and what he is not to do.

The course takes up such essential phases of the work as learning the case, setting the stick, proving, justification, spacing, indention, distribution, tying up type, locking up, pressfeeding, makeready, and use of tools and machines. The back of the book contains space for a job-work record and proof sheet.

What Do You Know?

The testbook with a purpose. By Arthur Frank Payne. Cloth, 143 pages. Published by Rae D. Henkle Co., Inc., New York City.

The present book takes the form of a series of mental tests of general intelligence and natural adaptability for particular lines of work. While the tests are not a measure of intelligence proper, they are much more a measure of natural characteristics. Throughout the book the author has used not only the best known standard tests but many of the tests which he has evolved out of his own experience, practice, and investigations.

In the general use of the book, the author has recommended a simple system of self-marking and a strict adherence to the directions given in order to arrive at a working idea of the individual's intelligence, information, and aptitudes. While the book does not provide sufficient material for a complete mental or educational test of the individual, yet it offers sufficient information to indicate many of the special abilities of the individual. The author has arranged the tests in such a way that they may be used alone or by a group of persons as desired. Answers to each test are given on the reverse of the leaf of questions.

Among the topics treated in the book are: What do you know about words; what do you know and what do you see; what do you know and what do you think; what do you know about grammar; what do you know about arithmetic; what do you know about word proportions; what do you know about proverbs; what do you know about things generally; what do you know about personality; what do you know about children.

How to Work With Tools and Wood.

Cloth, 180 pages. Price, $1. Issued by the Stanley Rule & Level Co., New Britain, Conn.

This book has been issued with the idea of giving a mass of practical information in condensed form on the use of tools in woodworking. It tells how to make a workbench and a bookrack and includes useful informa-

tion on the care of tools in general. While the book uses material that stimulates interest in woodworking and the use of tools, it will at the same time tie up the work with home activities, giving any boy a grasp of practical information that will permit him to construct many things about the home. In addition it should serve as a splendid reference book. A carefully prepared index serves as a guide to the entire field of woodworking. The book is generously illustrated and is well bound.

Touch Wood

A tale of trees and their uses. Compiled, edited, and published by The American Lumberman, Chicago, Ill.

This little paper pamphlet of 62 pages takes the form of a short story of the nature, characteristics, and uses of wood. The book opens with a discussion of wood and its uses in the home, then it describes the value of wood in the schoolroom, in the store, and in the manufacturing world. It tells the story of lumber, how the trees are cut, hauled to mills, and made into products for mankind; how trees are used; how wood is used by the railroads; how woods of various kinds travel to the furniture and automobile factories; how wood is made into handles for various articles of general use; the use of wood for musical instruments; wood for veneers and airplanes, and wood for telegraph poles. The last part of the pamphlet is devoted to a brief history of the lumbering industry, its growth, and the measures being taken to replenish the timber supply of the country.

The book is written in simple language, suitable for young people, is well illustrated, and should prove exceedingly helpful in industrial-arts classes where a knowledge of wood is essential as a part of the course in woodworking and products made of wood.

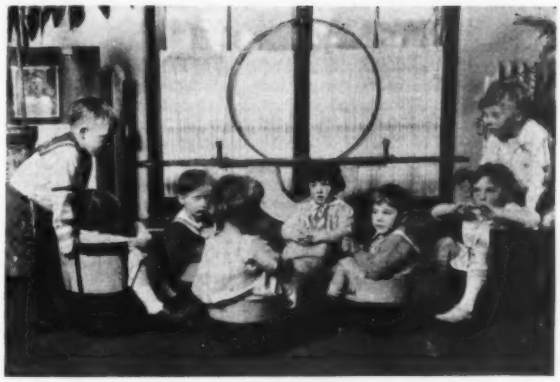
Some Problems of Individual Instruction in the Shop. By Wm. T. Bawden, Tulsa, Okla. The pamphlet is a report of a conference of representatives of institutions in the Mississippi Valley States engaged in training teachers of the manual arts and industrial education, held at the University of Chicago, in December last. The conference took up such topics as problems of individual instruction in the school shop, individual instruction sheets, objectives of the home-mechanics shop, preparation of teachers for the general shop, training of teachers in service, titles and content of advanced courses in vocational education for graduate students, types of curricula, and practical problems in shop planning, machinery, and equipment for study by prospective teachers.

Forestry Handbook for Teachers. The study of forestry and forest products is closely linked with the subject of shopwork in the schools. In order to help teachers choose the right material for lessons in forest study, the forest service of the U. S. Department of Agriculture has issued a bulletin entitled "The Forest: A Handbook for Teachers." The bulletin which was prepared by Miss D. Priscilla Edgerton, state supervisor of forestry education in Mississippi, contains material adapted to the graded schools and to other departments in the school system.

Each of the outlines in the bulletin includes a brief section of subject matter, illustrative material, study questions, practical exercises, supplementary reading suggestions, and correlation with other subjects in the curriculum. The outlines for the seventh, eighth, and ninth grades contain material on forest products, relation of the forest to manufacturing, transportation, and other industries, and material about the manufacture of lumber, paper, and other products. The bulletin contains a bibliography of reading material adapted to the different school grades.

ART EDUCATION FOR TALENTED CHILDREN

Miss Mabel Arbuckle, supervisor of art in the elementary schools of Detroit, Mich., writing in the *Detroit Educational Bulletin*, discusses the aims of art education in the elementary schools and means for carrying out the objective with the most efficient results.



KINDERGARTEN PLAY APPARATUS IN USE.

Miss Arbuckle states that one of the aims of art education is to ascertain, conserve, and develop the creative ability of pupils with natural artistic endowment for the production of beauty in the fields of fine arts and industry.

In order to carry out the objective in Detroit with the most efficient results, the art teachers formed an association a year ago. A committee of 27 teachers was appointed, with Miss Grace Conover, assistant supervisor, as chairman. The committee appointed a group of instructors to take charge of Saturday morning and afternoon classes in both the first and second semesters. Two art teachers were appointed to serve each Saturday as assistants to the instructors.

Miss Gertrude Gilmore, curator of the Children's Museum, has given the use of a large room on the third floor and has cooperated with the instructors in carrying forward the work. Free and valuable classroom space has been given, as well as stimulating material from which the pupils may work. Easels and other equipment were provided by the vocational education department.

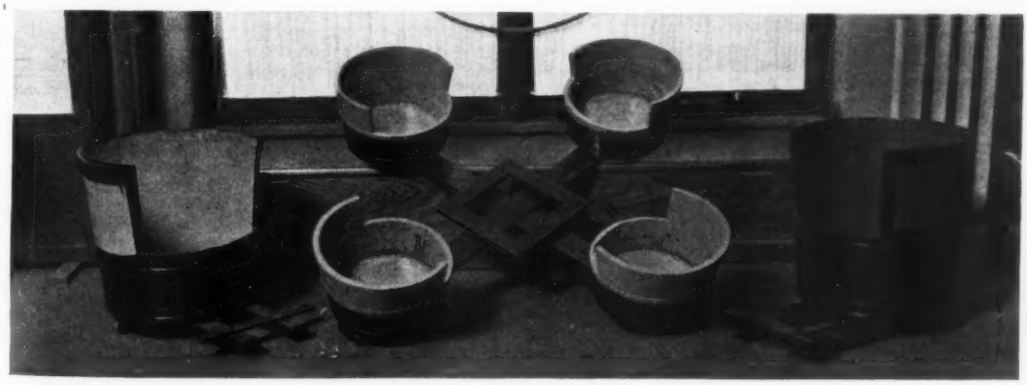
The teachers are ever on the alert to discover latent ability in the schools. When a child is found with exceptional ability, he is asked to execute several free compositions outside of class. After the type of ability and special interest of the child is revealed, the work is submitted to the chairman and the instructors. If approved, the child is entered in the class for a month's free trial.

During the year there have been 125 recommendations by teachers for these classes. Of these, 90 were selected as showing the greatest natural endowment. The present attendance of the classes is between 40 and 50 each week. Plans have been formulated whereby a means for financing the work may be achieved, that the classes may be carried on through the school year 1927-28.

PLAY APPARATUS FOR KINDERGARTENS

E. W. Tuttle, Director of Department of Practical Arts, East Orange, N. J.

The accompanying illustrations are of photographs taken in the kindergarten of the Ashland School, East Orange, N. J. These very practical and economical pieces of apparatus were contributions of the practical-arts shop. The project is simple, interesting, and very useful. Wooden pails and butter tubs were fashioned into amusing and fun-making devices. A brilliant color scheme adds materially to the life and atmosphere of the room. Rubber-tired ball-bearing casters are highly essential and contribute much to the success of the running gear.



PLAY APPARATUS FOR KINDERGARTEN USE. MADE IN THE PRACTICAL-ARTS SHOP, ASHLAND SCHOOL, EAST ORANGE, N. J.

THE ELECTRICAL DRAWING COURSE IN THE TECHNICAL HIGH SCHOOL

Electrical drawing is one of the subjects which must be taken by a student entering the Brooklyn Technical High School in Brooklyn, New York. The course covers four periods per week during the school year. It is vocational in character, the purpose being to offer such a general knowledge of electrical conventions, symbols, etc., that the student will be capable of reading drawings in any branch of the electrical industry, and in some cases to equip boys with special aptitude for work as electrical draftsmen and designers. As the work is carried on in connection with thorough courses in physics, electrical theory and practice, mathematics, and shopwork, it is expected that the graduates will be fitted eventually to do work of an engineering character. Writing in *High Points,* Mr. Harold E. Taylor describes the course as follows:

"Under the arrangement of the course, the student begins his work in electrical drawing in the fifth grade, with a background of knowledge in drawing acquired in the first four grades of his high-school career. The course covers selection, placing, and drawing of views, orthographic projection, drawing and lettering technic, design of standard machine elements, elementary descriptive geometry, and work in architectural planning and conventions, and structural design. The student thus gains an excellent background of shop practice in wood and metals and a knowledge of materials and processes in industrial lines. He also takes physics and physical measurements simultaneously in connection with electrical drawing.

"In the work, two major projects occupy the fifth and sixth grades respectively. The work of the fifth grade centers about the details of a small direct-current generator, while the sixth grade is concerned with the drawing of a service-station switchboard, circuit, and apparatus.

"As the students in the fifth grade are beginners in electrical studies, it was thought best to place the emphasis in this grade upon a furtherance of the student's knowledge of mechanical drawing, applying this to things electrical. Here the students gain experience in laying out a detail sheet and combining these details into an assembly drawing. Various assemblies are made, comprising brush-holder parts, commutator spider and segments, field frame, bearings, and the like. Much of the work of the previous terms is reviewed and applied. The use and technic of cross sections, standard machine elements, finish marks, uses of materials, and principles of orthographic projection are all given a new application. In this work the student

M. S. OLSEN,
Principal, Boys' Vocational School,
Minneapolis, Minnesota.

gains a knowledge of the construction of electrical machines and becomes familiar with their parts and the functions of each. The work is carried on with the aid of blue prints and blackboard sketches, as well as from parts of small machines which the boy handles and measures with calipers, scale, depth gauge, micrometer, etc. The student must become sufficiently familiar with shop processes and the manufacture of the measured parts to select intelligently the requisite dimensions.

"When the sixth grade has been reached, the student has had the benefit of a term's work in physics and physical measurements and is able to begin applying this knowledge. Beginning with the simplest conception of a wiring diagram, the student is required to develop and expand it until it becomes the diagram of a direct-current service switchboard with generator and feeder panel. After the student has become familiar with the function of each piece of apparatus in the circuit and its construction, he is asked to make a drawing of the circuit and a front view of the panels.

"In selecting the arrangement of the apparatus, such things as safety, convenience for the operator, space requirements, economy, and appearance are considered. The drawing of the circuit and front view is followed by a rear view, showing the contact studs, the bus bar, potential wiring, etc. In this work an opportunity is given to test the student's conception of the wiring diagram, as he is required to

EARL L. BEDELL,
Supervisor of Vocational Education,
Detroit, Michigan.

substitute the physical connections of the apparatus for their diagrammatic representation. If time permits, details of the various pieces of apparatus, such as switches, ammeter shunts, potential plugs, and receptacles are drawn.

"In all of the work, great stress is laid on the ability to make rapidly neat and intelligent sketches, and to read the sketches, as it is realized that comparatively few will become electrical draftsmen. All students, however, will need a ready understanding of the graphic language, and it is believed that through this method it can be most readily secured."

MR. OLSEN APPOINTED

Mr. Melvin S. Olsen has been appointed as principal of the boys' vocational school at Minneapolis, Minn. Following his graduation from the college of engineering at the University of Minnesota in 1908, Mr. Olsen was employed as a commercial draftsman up to February, 1909. Later he accepted a position as an instructor in drafting in the South High School, Minneapolis, where he remained until 1919. He was then called to take charge of the Smith-Hughes vocational work for the Minneapolis schools, which position he held until appointed as head of the boys' vocational school. Mr. Olsen has been active in part-time education for men and one of the important phases of his work has been his activities in connection with the janitor-engineering school of Minneapolis which has an enrollment of 330 men and 50 women.

The boys' vocational school to which Mr. Olsen has been assigned, has been built up from a small nucleus established in 1921 through the cooperation of interested local industries. The first unit was the automotive trade school, which was followed by the electrical trade school, the printing trade school, the woodworking trade school, and finally the tailoring trade school. It is planned to extend the work next fall with the addition of the machinist and upholstering trade schools. Under the arrangement adopted, the employers' associations provide part-time employment during the training period and agree to offer permanent employment upon completion of the course.

MR. BEDELL HEADS INDUSTRIAL WORK

Mr. Earl L. Bedell, formerly first assistant supervisor of vocational education at Detroit, Mich., has been appointed supervisor of vocational education under the direction of Mr. J. H. Trybom. Mr. Bedell was at one time superintendent of the Richland township schools near Cadillac, Mich., and later acted as principal of the Rockland schools. He came to Detroit in 1913 as a teacher of manual training where he remained four years. In 1917 he was

appointed instructor in drawing and shopwork in the Northwestern High School where he developed the course in household mechanics. In 1921 he was appointed as supervisor of household mechanics shops, and the next year was assigned to full-time supervisory work with the title of supervising instructor. In 1923 he was appointed as second assistant supervisor, with the same duties but with the additional work of developing a productive work program for school shops. In 1924 he was promoted to first assistant supervisor and was given charge of machinery and supplies for all shops and laboratories. In 1925 he was placed on a twelve-month basis and was given charge of the night school at the Northwestern High School. During the last year he has been made supervisor of vocational education working under Mr. Trybom, who has been given the title of director. Mr. Bedell holds the office of vice-president of the Western Arts Association and is active in the work of the industrial-arts section of the Michigan Education Association.

PRESIDENT LEE'S LETTER
The N. E. A. at Seattle

This is being written while en route home from the Seattle meeting of the National Education Association, where I went especially to attend the meeting of the department of vocational education. It is the second such meeting held in conjunction with the N. E. A. in which I have had a part since the first of the year. My reaction, which is shared by others, is the same for both meetings.

I went to Dallas with some misgivings as to the advisability of trying to swing even one meeting having to do with vocational education. Past experience had shown that the superintendents' section apparently was little interested in the field. Mr. Briggs, president of the department, however, had faith both in his audiences and his speakers and arranged three sessions, one of which was a banquet. His faith was justified, for not only did each speaker scheduled to appear actually appear but he was rewarded with excellent and interested audiences.

Not having learned my lesson at Dallas, I approached the Seattle meeting with the same misgivings. The department of vocational education was but one of sixteen similar meetings from which the delegates could choose. It is true we had excellent programs, including such speakers as Small of Massachusetts, Mrs. Burdick and Mrs. Baylor of the Federal Board, Goldberger of Pittsburgh, Hummel of Washington, Adams and Miss Arnold of Oregon, and Johnson and Ricciardi of California, yet was I dubious that all would be there or that we should hold more than a conference. Judge then of my delight when all but Ben Johnson appeared, and even he sent his paper to be read. Share with me the joy occasioned by the

J. M. HALL,
Camden, N. J.

Mr. James M. Hall, formerly acting chief of the trade and industrial-education service of the Federal Board for Vocational Education, has become director of the Camden County Vocational School at Camden, New Jersey. Mr. Hall will head an institution which serves the industrial firms of an entire county. An appropriation of $500,000 has been made for the maintenance of the school.

continued necessity of securing more chairs to accommodate those who claimed a place in an audience approximating two hundred people.

Vocational education is consistently challenging the attention of educators to a greater and greater degree at every meeting. It is true not only at N. E. A. meetings but at state meetings. The vocational sections of the California Teachers' Association are among the most largely and most enthusiastically attended of any. The vocational meetings of the Indiana State Teachers Association, which it was my privilege to address last year, were second to none in which I have ever participated. The story is repeated in almost every state association.

The same increasing interest is reflected in the summer sessions of the University of California at both Berkeley and Los Angeles. Enrollments in our classes in vocational education and vocational guidance exceed those of previous years and this condition is undoubtedly reflected throughout the leading summer schools of the

ERNEST N. ROSELLE,
Superintendent of Mooseheart, Ill.

Mr. Ernest N. Roselle, formerly superintendent of the State Home for Boys at Jamesburg, N. J., has been appointed superintendent of the Mooseheart National School at Mooseheart, Illinois. Mr. Roselle, who succeeds Mr. M. P. Adams, is well known in eastern vocational circles. He formerly served as principal at Bloomingdale, Garwood, and Franklin, N. J., and also had charge of the schools in various communities in Pennsylvania.

As superintendent of the Mooseheart School, Mr. Roselle will direct the care and training of more than 1,400 children, and will head a staff of several hundred employees.

country, for almost all of them are presenting a rich offering to their students this year.

He who runs may read the significance of this increasing interest. None of it is compelled by forces other than the deep-lying desire of men and women interested in the all-round training of youth to know what it is we vocational educators have to contribute to that all-round training. My prayer is that through our conventions, our classes, our writing, we may answer their need to the full.

The opportunity is before us as it has never been before. May we be found with our lamps burning.—*Edwin A. Lee, President, American Vocational Association.*

Answers

(See page 315)

1. a) Proceed from the known to the unknown.
   b) Proceed from the concrete to the abstract.
2. Late 18th and early 19th centuries.
3. From general principles to definite practice.
4. Patternmaking.
5. Columbia University.
6. Milwaukee, Wisconsin.
7. Guilds.
8. From facts to secure the theory, examining a number of cases to discover resemblances, and finally arriving at the principle.
9. Continuation school, cooperative-industrial school, and evening school.
10. Architectural drafting and mechanical drafting.
11. Household mechanics or general shop.
12. Industrial-Arts Magazine and Industrial Education Magazine.
13. True education deals with physical, moral, and intellectual development.
14. None.
15. Six lower grades, a three-year junior high school, and a three-year senior high school.

NOW, ARE THERE ANY QUESTIONS?

Painting Zinc and Galvanized Iron

725. Q.: Will you please list and explain the various ways of finishing metal, such as enameling, etc.?—*C. E. K.*

726. Q.: Is there any way that galvanized iron, soiled through handling and from acid marks, can be cleaned?—*C. E. K.*

A. These two questions are so closely related that they can best be answered in one discussion. Space may be saved too by quoting from a paper written originally by C. C. Culbertson in "The Industrial Finishing Journal," in which the whole problem is well analyzed:

"More or less trouble generally is experienced in making paint materials adhere to zinc or galvanized iron surfaces. These surfaces when new always have a 'greasy' feel to them, even though there may be no grease actually present. This 'greasy' feeling may be removed to a certain extent by washing with naptha, but this treatment is seldom severe enough to put the surface into proper condition for the paint coats to stick as tightly as they should.

"It is claimed by some, who have investigated the question thoroughly, that this property of zinc or galvanized iron not to hold paint is due to the zinc combining with the oil of the paint film to produce a soap. This soap layer, it is claimed, forms between the metal surface and the paint and thus prevents the paint from sticking to the surface, so that upon subsequent contraction and expansion of the metal the paint flakes off.

"Regardless of whether this, or some other condition, is the true cause of this nonsticking, it is a well-known fact that zinc or galvanized iron, which has been exposed to the weather for some time, holds paint much better than fresh surfaces. This is probably due to the zinc surface being attacked by oxygen and other chemicals, which are present in the air and in rainwater in various amounts, to form zinc salts which have a rougher surface and which do not react on the paint film in the same manner that the zinc does.

Producing Artificial Weathering of Zinc

"This 'weathering' of zinc and galvanized iron can be artificially produced by the use of various chemical washes which remove any grease that may be present, and in some instances form a coating of zinc chloride or other zinc salts to which paint adheres more readily than to plain zinc surfaces.

"One of the best chemical washes for this purpose is made as follows: Dissolve 12 ounces of copper chloride, 12 ounces of copper nitrate and 12 ounces of salammoniac in 4½ gallons of water, then add 12 ounces (by weight) of hydrochloric (muriatic) acid. This solution should be applied to the metal, allowed to dry until the next day, and the bloom brushed off. Then the paint should be applied as quickly as possible.

"Another wash, which has been used quite extensively, is made by mixing one part (by volume) of commercial hydrochloric (muriatic) acid with four parts of water. This solution should not be allowed to remain on the surface very long, especially in the case of galvanized metal, for fear of dissolving most of the zinc. As soon as the surface is dry the paint may be applied.

"Still another zinc wash is an ammonia solution which should be applied to the surface as strong as the workman can stand it. This solution, however, has the drawback of having a rather disagreeable odor, and it does not give as good results as some of the others.

"Still another method of treating galvanized iron or zinc is to first wash the surface with naphtha or benzine, and then coat the work with a solution of copper acetate made by dissolving six ounces of copper acetate to a gallon of water. After this solution is dry the painting operations may proceed in the usual way.

Protection to Painters' Hands Required

"It is to be understood, of course, that an earthen or glass vessel should be used for holding any of these solutions. Care must be taken also to protect the hands of the workmen, especially where a solution containing acid is used. This can be done by thoroughly saturating the hands with linseed oil and wiping off the excess oil with burlap or an old cloth, before beginning the work.

"As a general rule, the best method of applying any of the solution is to wash the surface with a cloth or piece of burlap wet in the solution, or a soft, flat brush may be used if desired.

"Another important point to bear in mind is that the metal should be painted soon after the galvanized-iron wash has done its work and the moisture has evaporated from the metal. If too much time elapses between the wash treatment and the first coat of paint, much of the good effect derived from the wash will be lost.

"Where it is not desired to use one of these chemical washes, and if the equipment is available, the use of a sand blast is recommended. This roughens the metal and gives the primer the safe foothold that is desired. Where the sand blast is used, the work should be coated as quickly as possible to prevent the formation of rust, should the thin coat of zinc on the galvanized metal be broken by the blast of sand."

A Practical Method for School Shops

In the Mooseheart shop, articles made of galvanized steel for *inside use* are thoroughly washed with vinegar, allowed to dry, then sandpapered, and any of the good automobile enamels is applied, using the undercoat recommended in the directions for use. We have found that the regular lacquers now used on automobiles give good results if the instructions for application are followed. For outside work we use "Galvanum," manufactured by the Goheen Corporation, Newark, N. J., which requires no special weathering of the metal.—*J. A. Brandt.*

Marble Stains

729. Q.: How can oil stains be removed from interior marble? —R. B.

A.: A complete reply to this question can be had from the National Association of Marble Dealers, Rockefeller Bldg., Cleveland, Ohio. Perhaps the following condensed report from a recent issue of the Technical News Bulletin of the United States Bureau of Standards will contain the necessary information:

Stains from linseed oil and lubricating oil are often very hard to remove unless the stained part of the marble can be heated, and in some parts of a building this may not be feasible. For linseed-oil stains mix equal parts of wood alcohol and a 10 per cent solution of trisodium phosphate. Saturate a layer of cotton in this mixture and paste it over the stained part of the marble. When the cotton is dry repeat the operation. Several applications may be necessary. Wherever it is practical to use the following method more speedy results will be obtained: Make a poultice of asbestos fiber and the solution mentioned above. Plaster a layer about one-fourth inch thick over the stain. Cover the poultice with a scrap slab of marble and place on this a hot smoothing iron of about the temperature used for ordinary pressing.

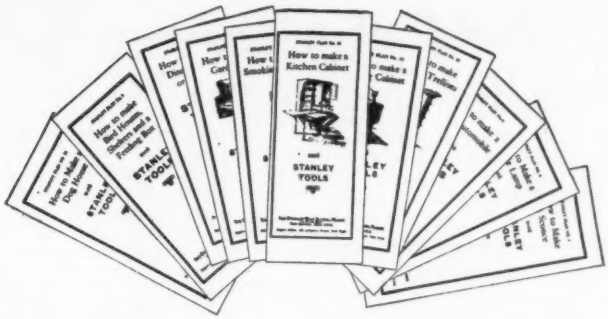
Lubricating-oil stains may be removed by saturating a layer of cotton in a mixture of equal parts acetone and amyl acetate, pasting this over the stain and covering with a scrap slab of marble. Several such applications may be necessary. A more expedient means which may be used in many cases is to make a poultice of asbestos fiber and amyl acetate. Plaster a one-fourth-inch layer of this over the stain, cover with a scrap slab of marble, and apply a hot iron as described above.

Green stains which form on marble around copper or bronze work may be removed as follows: Dissolve 1 part of ammonium chloride in 4 parts of powdered talc. Add ammonia water and mix to a stiff paste. Apply a one-half-inch layer of this over the stain and leave until thoroughly dry. Deep stains may require a few repetitions of the process. Usually a small amount of the green stain will remain in the marble and prove difficult to remove by this method. Such can be overcome by applying a layer of cotton saturated in a weak solution of potassium cyanide. It should be remembered that potassium cyanide is a very active poison and should be handled with extreme care.

A poultice treatment that is satisfactory for use on general service stains, such as may occur on marble that has not received proper attention, is as follows: Dissolve 1 pound of trisodium phosphate in 1 gallon of warm water. Mix three-fourths pound of chlorinated lime to a paste by adding water slowly and mashing the lumps. Combine the trisodium phosphate solution and paste and add water to make 2 gallons. Stir thoroughly and keep it in a covered stoneware jar. Add enough of this mixture to powdered talc to form a paste of mortar consistency. Plaster this over the stained marble and leave it until dry, then scrape it off with a wooden paddle.

A very stubborn type of stain is sometimes found on marblework caused by pine wood burning in contact with the marble. This can be removed by means of the trisodium phosphate and chlorinate lime mixture mentioned above. In treating this type of stain it is best to soak a layer of cotton in the solution and paste it over the stain. Several repetitions may be necessary. The action may be greatly accelerated by using the hot iron as described under the linseed-oil treatment. In this case asbestos fiber should be used instead of a layer of cotton.

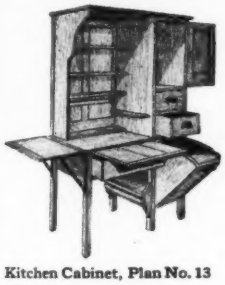
Mr. Raymond T. Fell, who has been secretary-treasurer of the Western Arts Association since 1925, has presented his resignation, to take effect September 1. Mr. Fell is a member of the Ohio bar and is at present an instructor in the Bloom Junior High School in Cincinnati.



11 New Stanley Plans

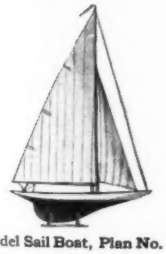
Let us send you a set—Free!

Smoking Cabinet, Plan No. 12



Kitchen Cabinet, Plan No. 13

Cedar Chest, Plan No. 15



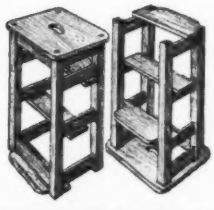
Model Sail Boat, Plan No. 18

Vacation is here. But soon you will be laying out your fall work. These Stanley Plans will suggest ideas and designs for new and interesting projects. Each one contains complete working drawings, stock layouts, list of materials required and list of tools needed to do the work. Possibly you can use them for classroom study and extra assignments. Complete detailed instructions are included to guide the amateur worker.

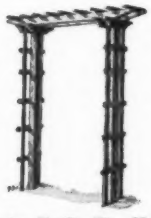
We invite manual training instructors to examine these plans and use them. A complete set will be sent you free of charge. Your boys can purchase these plans for 10c each, which covers the cost of printing and handling.

You will find Stanley Plans both interesting and practical. Send for a complimentary set today.

THE STANLEY RULE AND LEVEL PLANT
Educational Department, New Britain, Conn.



Combination Kitchen Seat and Step Ladder, Plan No. 20



Garden Trellis, Plan No. 22

Garden Seat, Plan No. 21

Combination Sail & Row Boat (full size), Plan No. 19

End Table, Plan No. 16

Tea Wagon, Plan No. 17

Sewing Cabinet, Plan No. 14

STANLEY S.W.

STANLEY TOOLS

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

What is the "Web" of a twist drill?

And the "Heel" — the "Lips" — the "Body" — and just where is the "Point"? Do you know just what "Lip Clearance" means?

The "HANDBOOK FOR DRILLERS" answers every question the student of modern drilling practice must know. It tells him not only the "How" but—what is more important the "Why" of the different parts of the twist drill.

Because this booklet is both theoretical and intensely practical, it is being used by hundreds of Vocational, Technical and High Schools throughout the world as the standard textbook on drilling practice.

The "HANDBOOK" is issued by this Company, not to promote the sale of its products, but to educate prospective and not a few **experienced,** drill users to a better and more intelligent understanding of the twist drill and its use.

Instructors are cordially invited to ask for copies of the "HANDBOOK FOR DRILLERS" in any reasonable quantities free of charge, for the use of their students.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

NEWS AND NOTES

Boys Build Furniture. The boys of the industrial-arts department of the Cincinnati public schools will be occupied the coming summer, as in previous years, in making furniture for the schools. The work will be done in the Withrow and Woodward school shops. The cost will reach $10,200.

High School Asks Smith-Hughes Aid. The high-school mechanic-arts department at Rochester, N. H., has asked for Smith-Hughes aid for its vocational work during the next year.

Vocational Courses for Teachers. Courses in vocational and commercial education, open to men and women, will be offered by Dr. Charles A. Prosser and Prof. F. G. Nichols, in the Harvard University summer school, July 5 to August 13, at Cambridge University.

Employed Boys Succeed. The students of the Metropolitan High School of Los Angeles carried off 16 prizes at the boys' hobby display during the National Boys' Week held in Los Angeles in May. The showing is considered especially remarkable because the boys who are all employed and who attend class only four hours each week were in competition with all the full-time high schools of the city. The prizes were won in photography, ornamental ironwork, woodworking, and drawing.

Course in Vocational Agriculture. A course in vocational agriculture to be given by traveling teachers in selected high schools in southwestern New York, has been projected for the session of 1927-28 by the State School of Agriculture at Alfred, in cooperation with boards of education of the local schools. The plan was designed primarily for schools where the number of farm boys in attendance may not justify the employment of a full-time instructor but where the experiment develops such interest that it warrants part-time instruction during four years.

Propose New Part-Time School in Oakland. A study of part-time schools in California shows that only a few cities have planned special buildings for their schools, namely Los Angeles and Long Beach; others have new buildings in contemplation. Oakland has completed plans for a two-story structure to be devoted to part-time purposes. Pittsburg has a building which was constructed by the boys of the school. San Francisco, San Jose, Fresno, Sacramento, and Huntington Park have adapted old schools to serve for part-time classes.

Manual Training Prizes Awarded. The Duhamel department store at Rapid City, S. Dak., recently held a contest in which prizes were awarded to high-school students having the three best examples of furniture made in the manual-training class. All prizes were carpentry tools, ranging in value according to placings. The following awards were made: First prize, bedside table of Queen Anne design; second prize, gate-leg table; third prize, dining-room table in William-and-Mary design.

In addition to the pieces designated as the winners of the contest, there were also displayed a chest in Spanish design; a sewing cabinet; a radio cabinet; a four-poster bed; a rocking chair; a chest, and a floor lamp. All of the pieces were constructed by the students under the direction of Mr. O. H. Schwentker, head of the manual-training department.

Propose Michigan Vocational Association. At a recent meeting held at Ann Arbor, Michigan, steps were taken toward forming a state-wide manual-arts and industrial-education association. A committee has been appointed to prepare a constitution and a plan of organization. The association will draw its membership from nine different districts of the Michigan Education Association.

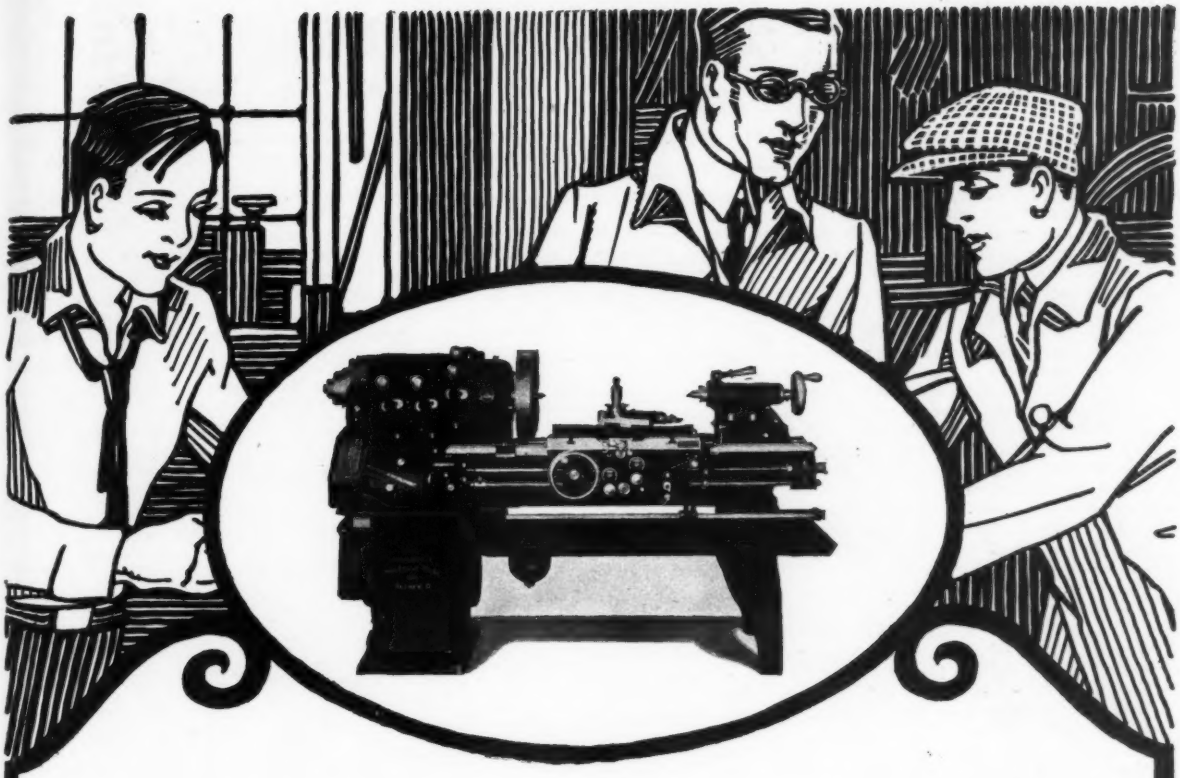
Pratt Institute Graduates Largest Class. Pratt Institute, Brooklyn, New York, graduated its largest class, 585 students, at exercises held on June 23. Of this number, the School of Science and Technology contributed 189, while the School of Household Science and Arts contributed 187, and Fine and Applied Arts, 182.

Complete Training of World-War Veterans. The national rehabilitation committee in Washington, D. C., has announced the early completion of the work of training disabled world-war veterans. Only about 1,000 war veterans are at present receiving training, out of nearly 180,000, who were given training by the rehabilitation bureau. A total of 334,053 men applied for training courses, the total cost of which was $650,000,000. The largest number of men in training at any time was 132,000 in the spring of 1922.

Add Smith-Hughes Department. A Smith-Hughes department has been added to the vocational school at Leesburg, Ohio. Mr. V. R. Dent of Marion, Ohio, has been appointed as director and will assume his duties in September.

Course for Vocational Teachers. A free lecture course for vocational teachers on the subject of accident prevention has been arranged by the industrial commission of New York State, in cooperation with the division of vocational and extension education of the state department. The course consists of fifteen lectures and will be given in Buffalo, Rochester, Syracuse, Oswego, and Schenectady.

Will Build Addition to Trade School. The board of estimate of Trenton, New Jersey, has granted an appropriation of $38,000 for an addition to the vocational school.



Train Your Students for Their Jobs — Use MONARCH LATHES

Train your students on MONARCH LATHES and when they go from your school they will be ready for their jobs —valuable men immediately without the necessity of going through another period of training in the shop.

The student that is trained on a Monarch Lathe is trained in actual shop practice — for the Monarch is the first choice of Industrial America. Today more Monarch Lathes are being sold to industrial plants than any other lathe built.

The Monarch motor-driven, helical geared Lathe is the ideal equipment for instructional purposes. It is far in advance of other lathes in design. It is as near danger-proof as any lathe can be made. It is as noiseless as any lathe can be—an important advantage in the instruction room.

Monarch Lathes are used in the Massachusetts Institute of Technology, Yale, Cornell, and in hundreds of the best technical and high schools — proof that the Monarch is the practical lathe for modern school equipment.

The success of your school and the success of your students are inseparably linked together. Use MONARCH LATHES and meet the modern demand for training that *fits men for their jobs.*

Illustration above shows 14 x 6 helical geared Monarch Lathe

THE MONARCH MACHINE TOOL CO.

100 OAK STREET - - - - - - SIDNEY, OHIO

SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

ISSUE CATALOG OF BLUE-PRINTING FURNITURE AND SUPPLIES

The C. F. Pease Company of Chicago, Illinois, has issued its new catalog M-27, illustrating and describing its line of blue-printing machinery and paper and drafting-room furniture.

The catalog contains 95 pages in which are given a concise description of the Pease line of blue-printing machinery and accessories, blue-print paper, and drafting-room furniture. It lists the Peerless blue-printing, washing, and drying equipment; the Peerless blue-printing machine, with gas and electric heater attachment, and the Peerless negative apparatus; the Pease vertical electric blue-printing machine, and the Pease junior-vertical blue-printing machine; the Pease junior and improved sheet washer, and sheet dryer, together with a wide variety of blue-printing accessories, such as bathtrays, wringers, photographic art lamps, proofing machines, pinning device, trimming shears, tracing and cutting tables, and blue-print papers.

The catalog also lists and describes a variety of drafting-room furniture, including drawing tables, tracing tables, stools and chairs, steel filing cabinets, wooden sectional filing cases for drawings and tracings, and universal drafting machines. In fact, the catalog includes everything needed for the drafting-room and blue-print shop, arranged conveniently for immediate access. Information concerning any of the articles listed in the catalog may be obtained from the firm, 813 N. Franklin St., Chicago, Illinois.

PUTTING QUALITY PLUS IN CINCINNATI STANDARD ARBORS

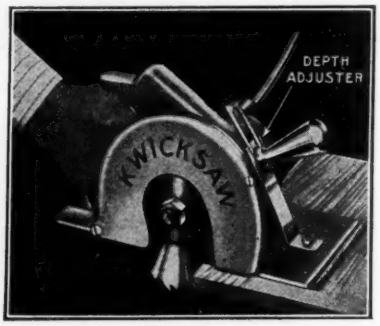
In a 24-page booklet published under the above title, the Cincinnati Milling Machine Company present a very interesting story of the various processes which that important element of a milling machine, *the arbor*, goes through from the rough forging to the finished product.

The story is extensively told by means of pictures which in themselves are an interesting and a valuable study of industrial process. They visualize that phase of production which is now discussed by our industrial experts to such an extent—quality, quantity production. Copies of the booklet may be obtained by writing to the Cincinnati Milling Machine Co., Cincinnati, Ohio.

NEW PORTER-CABLE "KWICKSAW"

The Porter-Cable Machine Company of Syracuse, N. Y., have developed a new light, electrically driven hand saw.

The saw can be used for both cut-off work and grooving in a school shop. It is of a high-speed type, the saw being directly connected to the arbor. A depth adjuster makes it possible to set the saw for any depth cut desired.



THE NEW PORTER-CABLE HAND SAW.

The saw is of good construction; all parts are built of aluminum and duralumin. Ball-bearings packed in grease, are used for the end bearings. The motor is well ventilated; the exhaust of air inside of the guard is used to blow away the sawdust from the work. Another outstanding feature is that the saw weighs only 10 lbs., hence, it can be easily guided with one hand. It can easily be attached to an outlet, or lamp socket. Ten feet of rubber conductor cables, together with one combination saw both for rip and crosscut purposes, are included as standard equipment. Moreover, the motor may be had at either 110 or 220 volt as specified.

DISSTON RENEWAL SERVICE FOR SCHOOLS

During the past year supervisors and instructors in school shops enjoyed the benefit of the special school service of Henry Disston & Sons, Inc., Philadelphia, Pa., which undertook to sharpen all handsaws, backsaws, circular saws, and machine knives and to put them in good condition for the year's work. A low charge is made for all sharpening.

This year an even better service will be available to shop instructors through the new "Disston Renewal Service." With this service all saws sent by instructors will be repaired by skilled sawmakers, who will do whatever is necessary to put them in first-class condition. The work will comprise straightening of bent saws, removal of kinks, recutting of tooth edges, and all necessary repairs without any extra charge. All saws are sent f. o. b. factory and the school must pay the carrying charges to and from the Disston plant.

NEW IMPROVED NIAGARA CRIMPER AND BEADER

The Niagara Machine & Tool Works of Buffalo, New York, has just placed on the market its new and improved Niagara crimper and beader. The machine is designed for handling 24-gauge material and is constructed similar to the heavy crimper and beader. The rolls are interchangeable and the nuts are countersunk, holding the rolls on the keyed shafts, and permitting the operator to work close to the edge of the metal.

NIAGARA CRIMPER AND BEADER.

A special feature of the machine is the adjustable wedge, which enables the operator to regulate the depth of the crimp and bead. Machine-cut steel bars and crimping rolls are used and a compact-gear, enclosed construction insures its standing up under hard usage for years. The machine is adapted for cornice or pipework.

Complete details of the machine will be furnished by the Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, New York.

Manual-Training Club Will Build Equipment for School. The manual-training club at Chanute, Kansas, has been given permission to make the furniture and equipment for a new school.

Propose Industrial Survey at Waco. An industrial survey has been begun at Waco, Texas, with a view of determining the city's needs in vocational education.

Manual-Training Course Added. A manual-training course has been added to the work offered at Port Clinton, Ohio.

Vocational School at Norristown, Pa. A remodeled church building is the new home of the vocational school of Norristown, Pa. Work will begin shortly on the installation of equipment and shop materials. It is planned to include considerable new machinery.

FRONT AND BACK OF MEDALS AWARDED TO STUDENTS OF SHEET-METAL WORK.

Less effort—yet, better standards

SURELY every teacher takes pride in watching a class progress to a high marking average. It is surprising to note how Kester Solder will enable a group of boys to do soldering that will compare with the work of a skilled mechanic.

Kester, by eliminating the acid pot, eliminates the uncertainty of soldering. A scientific flux inside this hollow wire of solder flows to the job as heat is applied. Immediately after, the bright solder melts and forms a bond, neatly, subtantially and quickly.

Send for samples of Kester and see the renewed interest your boys will take in their soldering projects.

KESTER *Self-Fluxing* SOLDER

[Trade Mark]

Kester Acid-Core Solder
1, 5, 10 and 20-lb. Spools
For General Work

CHICAGO SOLDER COMPANY, 4259 Wrightwood Ave., Chicago, Ill.
Gentlemen: Please send the following number of working samples:

.....Kester Acid Core Wire Solder .....Kester Rosin Core Wire Solder

The number of boys in our shops are: General Shop..... Electrical.....
Sheet Metal ..... Home Mechanics.....

Signed.....

Instructor in..... School.....

City..... State.....

Kester Rosin-Core Solder
1, 5 and 10-lb. Spools
For delicate Electrical Work

NEWS AND NOTES

Cabinetmaking Shop Completes Forty Typewriter Desks. The cabinetmaking shop of the boys' vocational school, Albany, New York, has recently completed forty typewriter desks for a new junior high school. The desks have two drawers and accommodate two pupils at a time. They are made in three sizes in order to accommodate the smaller, as well as the larger pupils. On the back of each desk is a bar that extends the entire length of the desks. The desks were constructed in oak, and were wood-filled, stained, and shellacked.

Manual-Training and Home-Economics Exhibit at Sterling, Colorado. The industrial-arts department at Sterling, Colorado, held an exhibit of the work in manual training and home economics of the fifth to the eighth grades during the early part of June.

The manual-training work is organized on the basis of boy interests and job analysis. After a study of the boys' "hobbies" and individual interests, some useful project is suggested which will meet the boy's particular interest and grade. Each project selected must be of such a character that it will correlate with the other subject matter and will stimulate a desire for information on the part of the pupil.

Each class in the shop is in charge of a student foreman. This foreman is selected each month on the basis of efficiency in classwork and cooperative spirit in class. The shop foreman plan makes it possible to assign a good deal of the routine work to students, leaving the instructor free to give individual attention to the class; it also makes it possible to have a great variety of projects in operation at the same time, and it promotes a cooperative spirit similar to that which exists in the modern factory. The industrial-arts work is under the direction of Mr. George F. Bright, who attributes the success of the shopwork to the student foreman and cooperative plan of shop procedure.

Will Build Vocational School. The county board of education of Essex county, New Jersey, has adopted plans for a boys' vocational school to be erected at Bloomfield. The board will spend $450,000 for the building.

Propose Cooperative Trade Training for Boys. Mr. F. R. Love, principal of the Vocational School at Stockton, California, has formulated a plan through which boys may, after two years in high school, go into an industrial plant or machine shop and complete the remaining two years of the course.

Under the plan a cooperative arrangement is to be followed. Two boys will have one job, alternating between work and school. They will be employed full time during rush periods of work and sent to school for an equal amount of time.

Will Erect Vocational School. The board of education at Highland Park, Michigan, has voted $140,000 for a vocational school to meet the demand for a wider range of exploratory work in the junior high school. The building will contain fourteen rooms and will house 500 students in various activities. Such courses as woodworking, metal work, machine-shop practice, auto mechanics, mechanical drawing, printing, cabinetmaking, and carpentry will be taught.

Vocational Survey of Ambridge. An industrial survey of Ambridge, Pa., was conducted recently to indicate the vocational work which would prove practical in establishing an industrial course in the schools.

Manual-Training Course Established. A manual-training course for high-school students has been established at Uhrichsville, Pa.

Hold Model Airplane Contest. More than 300 boys were in attendance at the fourth model airplane contest held at Akron, Ohio, under the auspices of the *Beacon-Journal*. The five best flights were made by Frank Brown, East High School; Charles Miller, West High School; Claude Warley, South High School; Milo Snyder, South High School, and George Burrell, Leggett High School. Brown's model covered the course in 4 3/5 seconds; those of Miller and Warley in six seconds; and the other two in seven seconds each. The three highest in the duration contest were Miller, Clifton, and Snyder. Special mention was given to the model of Jack McCausland of the Bath School. The final contest for cash prizes and trophies was held May 30 at the Akron-Cleveland Speedway, when cash prizes amounting to $140 and seven trophy cups were awarded. The winners in the speed event are eligible for the Stout national trophy which is awarded the victorious city under the rules of the National Aeornautical Association.

Hold Conference of Western States. A conference on vocational education was held at Salt Lake City, Utah, during the week of June 9. The attendance was made up of persons interested in vocational and industrial education from the eleven western states. The work of the conference is divided into three sections—trade education, home-economics education, and agriculture.

Good Schools deserve "YANKEE" Tools

Removing starter screws with a "Yankee" Quick-Return Spiral Ratchet Screw-driver No. 130-A

One-handed

you can quickly drive (or draw) screws in tight places

That's where you want the "Yankee" Quick-Return Spiral Ratchet Screw-driver.

Put the blade in the screw slot. The spring in the handle holds it there.

You just push on handle.

The live spring brings handle back for the next push.

The long reach prevents barked knuckles.

"YANKEE"

Quick Return Spiral Ratchet Screw-driver No. 130-A

Right and left ratchet; and rigid. Three sizes of bits: No. 130-A, Standard size, No. 131-A, Heavy pattern, No. 135, Light pattern.

Without the Quick-Return feature, No. 30-A, No. 31-A, No. 35.

Some Other "Yankee" Tools

Plain Screw-drivers	Automatic Push Drills
Ratchet Bit Braces	Automatic Feed Bench Drills
Ratchet Breast and Hand Drills	Vises, Removable Base

"Yankee" on the tool you buy means the utmost in quality, durability, and efficiency

Dealers Everywhere Sell "Yankee" Tools.

FREE New "Yankee" Tool Book

This interesting little book is for all lovers of fine tools. It tells just what you want to know about all the famous "Yankee" Tools. Write for your copy today.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

Among those taking part in the discussions of the three groups were: Carl E. Warner, state supervisor of trade and industrial education, Montana; Leslie G. Stier, assistant director vocational education, California; J. W. Kelly, state supervisor, Washington; A. E. McArthur, state supervisor, Nevada; C. W. Kent, local supervisor, Reno, Nev.; W. S. Kienholz, director vocational education, California; F. E. Gilpin, supervisor, Arizona; Sidney Owen, local director, Phoenix, Ariz.; H. A. Tiemann, state supervisor, Colorado; D. W. Rockey, state supervisor, New Mexico; Benjamin E. Hallory, supervisor teacher training, California; N. B. Giles, state supervisor, Idaho; Anna Burdick, federal agent, Washington, D.C.; V. D. Adams, state supervisor, Oregon; Frank C. Vincent, local director, Sacramento, Calif.; J. C. Beswick, supervisor, California; Benjamin W. Johnson, assistant director vocational education, California; F. M. Treat, state director vocational education, Wyoming; A. M. Davis, state director and supervisor, Arizona; L. S. Noall, state supervisor, Utah; L. B. Travers, state supervisor, California; I. L. Williamson, state director vocational education, Utah.

Manual-Training Students Make Variety of Articles. Birdhouses and bookracks were among the popular articles made by manual-training pupils at Mankato, Minn., during the school year. Stepladders were next in importance, while breadboards, smoking stands, and picture frames were also made. In the sheet-metal department, the students supplied their mother's kitchen needs, making tin cups, funnels, cookie cutters, and other useful articles.

Manual-Arts Work Limited. Manual-arts work is to be taken out of the grade schools at Omaha, Nebr., the coming year and is to be limited to the junior and senior high schools.

Will Erect Vocational High School at Minneapolis. The board of education of Minneapolis, Minn., will take immediate steps toward the erection of the first unit of the proposed vocational high school to cost $900,000. The first unit will be erected at a cost of about $450,000.

New Classes Added to Haverhill Trade School. New classes in automobile repair and printing have been added to the trade school at Haverhill, Mass. A total of 132 applications have been received for enrollment but only 32 may be accommodated in the two classes.

New Vocational School to be Erected. The new building program for the schools of Tulsa, Okla., includes an appropriation of $100,000 for a vocational school.

PERSONAL NEWS

Miss Ruth Stevens of Lind, Wash., has accepted a position as director of Smith-Hughes home-economics work at Fairfield.

Mr. D. M. Clements has been reelected as state supervisor of vocational education for Tennessee, and **Mr. James A. Arentson** as supervisor of trades and industrial work.

Mr. F. Dean Bradley, state director of vocational education for Nevada, has been confined to a Reno hospital for a number of weeks.

Mr. H. F. Peters, head of the department of vocational agriculture at Fairbury, Nebr., has accepted a similar position at Hastings, at a substantial increase in salary.

Mr. Roy Johnson, formerly head of the manual-training department at Denison, Iowa, has been elected superintendent of schools at Gilmore City.

Mr. Pinckley Miller has been elected head of the manual-training department at Sedalia, Mo. **Mr. D. S. Davenport** has been elected as manual-training instructor.

Mr. V. C. Fryklund, head of the industrial-education department of the State Teachers' College, Kearney, Nebr., who has been on an extended leave of absence, returned to the college on June 1 to complete the work of the school year. Mr. Fryklund has completed work leading to a master's degree.

Mr. David Gustafson has been appointed head of the Typothetae school of printing at the Carnegie Institute of Technology, and **Mr. J. C. Martin,** a member of the printing faculty for the past eleven years, has been appointed as chief instructor in printing craftsmanship. Both these men have been appointed to carry out the program of education of the United Typothetae of America which has been introduced at the Carnegie Institute. Mr. Gustafson received his training at Bethel Institute, St. Paul, Minn., and at the University of Chicago, and holds degrees given by the latter institution. He has had teaching experience at the University of Chicago and at Northwestern University.

Mr. Martin, who will have charge of the shop courses at the Institute, is thoroughly acquainted with printing instruction. He came to Carnegie in 1917 as an instructor, and three years ago was made chief instructor in shop courses. For the last year and a half he has been acting head of the printing department.

Mr. Chriss Bradley of Mayetta, Kansas, has been appointed head of the vocational agricultural work at Delphos.

Mr. William J. Night, supervisor of apprentice training, has been elected president of the Syracuse Vocational Club. Mr. Night succeeds F. J. Smith. Other officers elected were Mr. Frederick Kern, who was elected vice-president, and Mr. John P. Jacks, who was named secretary-treasurer.